IMPERIAL COUNTY
AIR POLLUTION CONTROL DISTRICT

Highway 98 heading west. Source: https://media.expedia.com/media/content/shared/images/travelguides/El-Centro-1620-smallTabletRetina.jpg

October 1, 2015
Exceptional Event Documentation
For the Imperial County PM_{10} Nonattainment Area

FINAL REPORT

October 4, 2018

TABLE OF CONTENTS

SECTION PAGE

LIST OF FIGURES

FIGURE **PAGE**

LIST OF TABLES

TABLE PAGE

ACRONYM DESCRIPTIONS

AOD	Aerosol Optical Depth
AQI	Air Quality Index
AQS	Air Quality System
BACM	Best Available Control Measures
BAM 1020	Beta Attenuation Monitor Model 1020
BLM	United States Bureau of Land Management
BP	United States Border Patrol
CAA	Clean Air Act
CARB	California Air Resources Board
CMP	Conservation Management Practice
DCP	Dust Control Plan
DPR	California Department of Parks and Recreation
EER	Exceptional Events Rule
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GOES-W/E	Geostationary Operational Environmental Satellite (West/East)
HC	Historical Concentrations
HYSPLIT	Hybrid Single Particle Lagrangian Integrated Trajectory Model
ICAPCD	Imperial County Air Pollution Control District
INPEE	Initial Notification of a Potential Exceptional Event
ITCZ	Inter Tropical Convergence Zone
KBLH	Blythe Airport
KCZZ	Campo Airport
KIPL	Imperial County Airport
KNJK	El Centro Naval Air Station
KNYL/MCAS	Yuma Marine Corps Air Station
KPSP/PSP	Palm Springs International Airport
KTRM	Jacqueline Cochran Regional Airport (aka Desert Resorts Rgnl Airport)
LST	Local Standard Time
MMML/MXL	Mexicali, Mexico Airport
MODIS	Moderate Resolution Imaging Spectroradiometer
MPH	Miles Per Hour
MST	Mountain Standard Time
NAAQS	National Ambient Air Quality Standard
NCAR	National Center for Atmospheric Research
NCEI	National Centers for Environmental Information
NEAP	Natural Events Action Plan
NEXRAD	Next-Generation Radar
NOAA	National Oceanic and Atmospheric Administration
nRCP	Not Reasonably Controllable or Preventable
NWS	National Weather Service

PDT	Pacific Daylight Time
PM_{10}	Particulate Matter less than 10 microns
$PM_{2.5}$	Particulate Matter less than 2.5 microns
PST	Pacific Standard Time
QA/QC	Quality Assured and Quality Controlled
QCLCD	Quality Controlled Local Climatology Data
RACM	Reasonable Available Control Measure
RAWS	Remote Automated Weather Station
SIP	State Implementation Plan
SLAMS	State Local Ambient Air Monitoring Station
SMP	Smoke Management Plan
SSI	Size-Selective Inlet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTC	Coordinated Universal Time
WRCC	Western Regional Climate Center

I Introduction

On October 1, 2015, State and Local Ambient Air Monitoring Station (SLAMS) located in Niland (AQS Site Code 06-025-4004), California measured an exceedance of the National Ambient Air Quality Standard (NAAQS). The Federal Equivalent Method (FEM), Beta Attenuation Monitor Model 1020 (BAM 1020) measured (midnight to midnight) 24-hr average Particulate Matter less than 10 microns (PM_{10}) concentration of 171.4 µg/m^3 (**Table 1-1**). PM_{10} 24-hr measurements above the 150 µg/m^3 are exceedances of the NAAQS. October 1, 2015 was not a scheduled run day for the FRM Size-Selective Inlet (SSI) high volume samplers in Imperial County. The SLAMS in Niland was the only station in Imperial County to record an exceedance of the PM_{10} NAAQS on October 1, 2015.

TABLE 1-1
CONCENTRATIONS OF PM_{10} ON OCTOBER 1, 2015

DATE	MONITORING SITE	AQS ID	POC(s)	HOURS	24-HOUR CONCENTRATION µg/m^3	PM_{10} NAAQS µg/m^3
10/1/2015	**Niland**	**06-025-4004**	**3**	**24**	**171**	**150**
10/1/2015	Brawley	06-025-0007	3	23	154	150
10/1/2015	Westmorland	06-025-4003	3	23	97	150
10/1/2015	El Centro	06-025-1003	3	24	86	150

*All time referenced throughout this document is in Pacific Standard Time (PST) unless otherwise noted[1]
*October 1, 2015 was not a scheduled run day and the Calexico did not run a continuous monitor

The Imperial County Air Pollution Control District (ICAPCD) has been submitting PM_{10} data from Federal Reference Method (FRM) Size-Selective Inlet (SSI) instruments since 1986 into the United States Environmental Protection Agency's (USEPA) Air Quality System (AQS). Prior to 2013 all continuous measured PM_{10} data was non-regulatory, thus measured in local conditions. However, by 2013 ICAPCD began formally submitting continuous FEM PM_{10} data from BAM 1020's into the USEPA managed AQS. Because regulatory consideration of reported data must be in standard conditions, as required by USEPA, all continuous PM_{10} data since 2013 is regulatory. On October 1, 2015, the Niland monitor was impacted by elevated particulate matter caused by the entrainment of fugitive windblown dust from high winds generated when the onshore flow deepened as a trough of low pressure passed through California.

This report demonstrates that a naturally occurring event caused an exceedance observed on October 1, 2015, which elevated particulate matter and affected air quality. The report provides concentration to concentration monitoring site analyses supporting a clear causal relationship between the event and the monitored exceedances and provides an analysis supporting the not

[1] According to the National Institute of Standards and Technology (NIST) Time and Frequency Division the designation of the time of day for specific time zones are qualified by using the term "standard time" or "daylight time". For year-round use the designation can be left off inferring "local time" daylight or standard whichever is present. For 2015, Pacific Daylight Time (PDT) is March 8 through November 1. https://www.nist.gov/pml/time-and-frequency-division/local-time-faqs#intl

reasonably controllable or preventable (nRCP) criteria. Furthermore, the report provides information that the exceedances would not have occurred without the entrainment of fugitive windblown dust from outlying deserts and mountains within the Sonoran Desert. The document further substantiates the request by the ICAPCD to exclude the PM_{10} 24-hour NAAQS exceedance of 171 µg/m^3 as an exceptional event. This demonstration substantiates that this event meets the definition of the USEPA Regulation for the Treatment of Data Influenced by Exceptional Events (EER)[2].

I.1 Demonstration Contents

Section II - Describes the October 1, 2015 event as it occurred in California and into Imperial County, providing background information of the exceptional event and explaining how the event affected air quality. Overall, this section provides the evidence that the event was a natural event.

Section III - Using time-series graphs, summaries and historical concentration comparisons of the Niland station this section discusses and establishes how the October 1, 2015 event affected air quality demonstrating that a clear causal relationship exists between the event and the monitored exceedance. It is perhaps of some value to mention that the time-series graphs include PM_{10} data measured in both local conditions and standard conditions. Measured PM_{10} continuous data prior to 2013 is in local conditions, all other data is in standard conditions. The concentration difference between local and standard conditions has an insignificant impact on any data analysis. Overall, this section provides the evidence that human activity played little or no direct causal role in the October 1, 2015 event and its resulting emissions defining the event as a "natural event".[3]

Section IV - Provides evidence that the event of October 1, 2015 was not reasonably controllable or preventable despite the full enforcement and implementation of Best Available Control Measures (BACM).

Section VI - Brings together the evidence presented within this report to show that the exceptional event affected air quality; that the event was not reasonably controllable or preventable; that there was a clear causal relationship between the event and the exceedance, and that the event was a natural event.

I.2 Requirement of the Exceptional Event Rule

The above sections combined comprise the technical requirements described under the Exceptional Events Rule (EER) under 40 CFR §50.14(c)(3)(iv). However, in order for the USEPA to concur with flagged air quality monitoring data, there are additional non-technical requirements.

[2] "Treatment of Data Influenced by Exceptional Events; Final Rule", 72 FR 13560, March 22, 2007

[3] Title 40 Code of Federal Regulations part 50: §50.1(k) Natural event means an event and its resulting emissions, which may recur at the same location, in which human activity plays little or no direct causal role. For purposes of the definition of a natural event, anthropogenic sources that are reasonably controlled shall be considered to not play a direct role in causing emissions.

I.2.a Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

The ICAPCD published the National Weather Service (NWS) forecast synopsis from the San Diego and Phoenix offices. The San Diego office described the trough of low pressure as moving through California bringing cooler weather along with locally strong westerly winds late in the day within the mountain passes and deserts. The Phoenix office explained that the existing High Pressure would give way to a couple of low-pressure systems that would affect the western states. The first, causing breezy conditions during the afternoon and evening hours would be dry but would bring cooler temperatures by Friday. The second system would bring additional cooling and chances for rain later Sunday, October 4, 2015 into Tuesday. Because of the potential for suspended particles and poor air quality, the ICAPCD issued a "No Burn" day in Imperial County. **Appendix A** contains copies of pertinent notices to the October 1, 2015, exceptional event.

I.2.b Initial Notification of Potential Exceptional Event (INPEE) (40 CFR §50.14(c)(2))

States are required under federal regulation to submit measured ambient air quality data into the AQS. AQS is the federal repository of Quality Assured and Quality Controlled (QA/QC) ambient air data used for regulatory purposes. When States intend to request the exclusion of one or more exceedances of a NAAQS as an exceptional event a notification to the Administrator is required. Notification occurs when an agency submits a request, which includes an initial event description, for flagging data in AQS.

On October 3, 2016, the US EPA promulgated revisions to the Exceptional Events rule, which included the requirement of an “Initial Notification of Potential Exceptional Event” (INPEE) process. This revised INPEE process requires communication between the US EPA regional office and the State, prior to the development of a demonstration. The intent of the INPEE process is twofold: to determine whether identified data may affect a regulatory decision and whether a State should develop/submit an EE Demonstration.

The ICAPCD made a formal written request to the California Air Resources Board (CARB) to place preliminary flags on SLAMS measured PM_{10} concentration from the Niland monitor on March 7, 2016. Subsequently there after the ICAPCD sent a revised request on March 18, 2016 providing additional information describing the event. **Table 1-1** above provides the correct concentration for Niland. The difference in concentrations between local and standard has an insignificant impact on any data analysis. The submitted request included a brief description of the meteorological conditions for October 1, 2015 indicating that a potential natural event occurred.

I.2.c Documentation that the public comment process was followed for the event demonstration that was flagged for exclusion (40 CFR §50.14(c)(3)(v))

The ICAPCD posted, for a 30-day public review, a draft version of this demonstration on the ICAPCD webpage and published a notice of availability in the Imperial Valley Press on April 20, 2018. The published notice invited comments by the public regarding the request, by the ICAPCD,

to exclude the measured concentrations of 171 µg/m^3 (**Table 1-1**), which occurred on October 1, 2015 in Niland. The final closing date for comments was May 21, 2018. **Appendix A** contains a copy of the public notice affidavit along with any comments received by the ICAPCD for submittal as part of the demonstration (40 CFR §50.14(c)(3)(v)).

I.2.d Documentation submittal supporting an Exceptional Event Flag (40 CFR §50.14(c)(3)(i))

States that have flagged data as a result of an exceptional event and who have requested an exclusion of said flagged data are required to submit a demonstration that justifies the data exclusion to the USEPA in accordance with the due date established by USEPA during the INPEE process (40 CFR §50.14(c)(2)). Currently, bi-weekly meetings between USEPA, CARB and Imperial County continue to discuss any potential documentation of events.

The ICAPCD, after the close of the comment period and after consideration of the comments will submit this demonstration along with all required elements, including received comments and responses to USEPA Region 9 in San Francisco, California. The submittal of the October 1, 2015 demonstration will have a regulatory impact upon the development and ultimate submittal of the PM_{10} State Implementation Plan for Imperial County in 2018.

I.2.e Necessary demonstration to justify an exclusion of data under (40 CFR§50.14(c)(3)(iv))

A This demonstration provides evidence that the event, as it occurred on October 1, 2015 satisfies the definition in 40 CFR §50.1(j) and (k) for an exceptional event.

- a The event created the meteorological conditions that entrained emissions and caused the exceedance.
- b The event clearly "affects air quality" such that there is the existence of a clear causal relationship between the event and the exceedance.
- c Analysis demonstrates that the event-influenced concentrations compared to concentrations at the same monitor at other times supports the clear causal relationship.
- d The event "is not reasonably controllable and not reasonably preventable."
- e The event is "caused by human activity that is unlikely to recur at a particular location or [is] a natural event."
- f The event is a "natural event" where human activity played little or no direct causal role.

B This demonstration provides evidence that the exceptional event affected air quality in Imperial County by demonstrating a clear causal relationship between the event and the measured concentration in Niland.

C This demonstration provides evidence of the measured concentrations to concentrations at the same monitor at other times supporting the clear causal relationship between the event and the affected monitor.

II October 1, 2015 Conceptual Model

This section provides a summary description of the meteorological and air quality conditions under which the October 1, 2015 event unfolded in Imperial County. The subsection elements include

- » A description and map of the geographic setting of the air quality and meteorological monitors
- » A description of Imperial County's climate
- » An overall description of meteorological and air quality conditions on the event day.

II.1 Geographic Setting and Monitor Locations

According to the United States Census Bureau, Imperial County has a total area of 4,482 square miles of which 4,177 square miles is land and 305 square miles is water. Much of Imperial County is below sea level and is part of the Colorado Desert an extension of the larger Sonoran Desert (**Figure 2-1)**. The Colorado Desert not only includes Imperial County but a portion of San Diego County.

FIGURE 2-1
COLORADO DESERT AREA IMPERIAL COUNTY

Fig 2-1: 1997 California Environmental Resources Evaluation System. According to the United States Geological Survey (USGS) Western Ecological Research Center the Colorado Desert bioregion is part of the bigger Sonoran Desert Bioregion which includes the Colorado Desert and Upper Sonoran Desert sections of California and Arizona, and a portion of the Chihuahuan Basin and Range Section in Arizona and New Mexico (Forest Service 1994)

A notable feature in Imperial County is the Salton Sea, which is at approximately 235 feet below sea level. The Chocolate Mountains are located east of the Salton Sea and extend in a northwest-southeast direction for approximately 60 miles (**Figure 2-2)**. In this region, the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect the northern-most extensions of the East Pacific rise. Consequently, the region is subject to earthquakes and the crust is being stretched, resulting in a sinking of the terrain over time.

FIGURE 2-2
SURROUNDING AREAS OF THE SALTON SEA

Fig 2-2: Image courtesy of the Image Science and Analysis Laboratory NASA Johnson Space Center, Houston Texas

All of the seven incorporated cities, including the unincorporated township of Niland, are surrounded by agricultural fields to the north, east, west and south (**Figure 2-6)**. Together, the incorporated cities, including Niland, and the agricultural fields make what is known as the Imperial Valley. Surrounding the Imperial Valley are desert areas found on the eastern and western portions of Imperial County.

The desert area, found within the western portion of Imperial County is of note because of its border with San Diego County. From west to east, San Diego County stretches from the Pacific Ocean to its boundary with Imperial County. San Diego County has a varied topography. On its western side is 70 miles (110 km) of coastline. Most of San Diego between the coast and the Laguna Mountains consists of hills, mesas, and small canyons. Snow-capped (in winter)

mountains rise to the northeast, with the Sonoran Desert to the far east. Cleveland National Forest is spread across the central portion of the county, while the Anza-Borrego Desert State Park occupies most of the northeast. The southeastern portion of San Diego County is comprised of distinctive Peninsular mountain ranges. The mountains and deserts of San Diego comprise the eastern two-thirds of San Diego County and are primarily undeveloped back county with a native plant community known as chaparral. Of the nine major mountain ranges within San Diego County, the In-Ko-Pah Mountains and the Jacumba Mountains border Mexico and Imperial County.

Both mountain ranges provide the distinctive weathered dramatic piles of residual boulders that can be seen while driving Interstate 8 from Imperial County through Devil's Canyon and In-Ko-Pah Gorge. Interstate 8 runs along the US border with Mexico from San Diego's Mission Bay to just southeast of Casa Grande Arizona.

FIGURE 2-3
JACUMBA PEAK

Fig 2-3: The Jacumba Mountains reach an elevation of 4,512 feet (1,375 m) at Jacumba Peak, near the southern end of the chain. Source: Wikipedia at https://en.wikipedia.org/wiki/Jacumba_Mountains

Northwest and northeast of the Jacumba Mountains is the Tierra Blanca Mountains, the Sawtooth Mountains and Anza-Borrego Desert State Park. Within the mountain ranges and the Anza-Borrego Desert State Park, there exists the Vallecito Mountains, the Carrizo Badlands, the Carrizo Impact Area, Coyote Mountains and the Volcanic Hills to name of few. Characteristically, these areas all have erosion that has occurred over time that extends from the Santa Rosa Mountains into northern Baja California in Mexico. For example, the Coyote Mountains consists of sand dunes left over from the ancient inland Sea of Cortez. Much of the terrain is still loose dirt, interspersed with sandstone and occasional quartz veins. The nearest community to the Coyote Mountain range is the community of Ocotillo. Of interest are the fossilized and hollowed out sand dunes that produce wind caves.

FIGURE 2-4
ANZA-BORREGO DESERT STATE PARK
CARRIZO BADLANDS

Fig 2-4: View southwest across the Carrizo Badlands from the Wind Caves in Anza-Borrego Desert State Park. Source: Wikipedia at https://en.wikipedia.org/wiki/Carrizo_Badlands

The Carrizo Badlands, which includes the Carrizo Impact Area used by the US Navy as an air-to-ground bombing range during World War II and the Korean War, lies within the Anza-Borrego Desert State Park. The Anza-Borrego Desert State Park is located within the Colorado Desert, is the largest state park in California occupying eastern San Diego County, reaching into Imperial and Riverside counties. The two communities within Anza-Borrego Desert State Park are Borrego Springs and Shelter Valley.

The Anza-Borrego Desert State Park lies in a unique geologic setting along the western margin of the Salton Trough. The area extends north from the Gulf of California to San Gorgonio Pass and from the eastern rim of the Peninsular Ranges eastward to the San Andreas Fault zone along the far side of the Coachella Valley. The Anza-Borrego region changed gradually over time from intermittently being fed by the Colorado River Delta to dry lakes and erosion from the surrounding mountain ranges. The area located within the southeastern and northeastern section of San Diego County is a source of entrained fugitive dust emissions that impact Imperial County when westerly winds funnel through the unique landforms causing in some cases wind tunnels that cause increases in wind speeds.

Historical observations have indicated that the desert slopes and mountains of San Diego are a source of fugitive emissions along with those deserts located to the east and west of Imperial County, which extend into Mexico (Sonoran Desert, **Figure 2-7**). Combined, the desert areas and mountains of San Diego and the desert areas that extend into Mexico are sources of dust emissions, which affect the Imperial County during high wind events.

FIGURE 2-5
ANZA-BORREGO DESERT STATE PARK
DESERT VIEW FROM FONT'S POINT

Fig 2-5: Desert view from Font's Point. Source: Font's Point Anza-Borrego Photographed by and copyright of (c) David Corby; Wikipedia at https://en.wikipedia.org/wiki/Anza-Borrego_Desert_State_Park

FIGURE 2-6
LOCATION AND TOPOGRAPHY OF IMPERIAL COUNTY

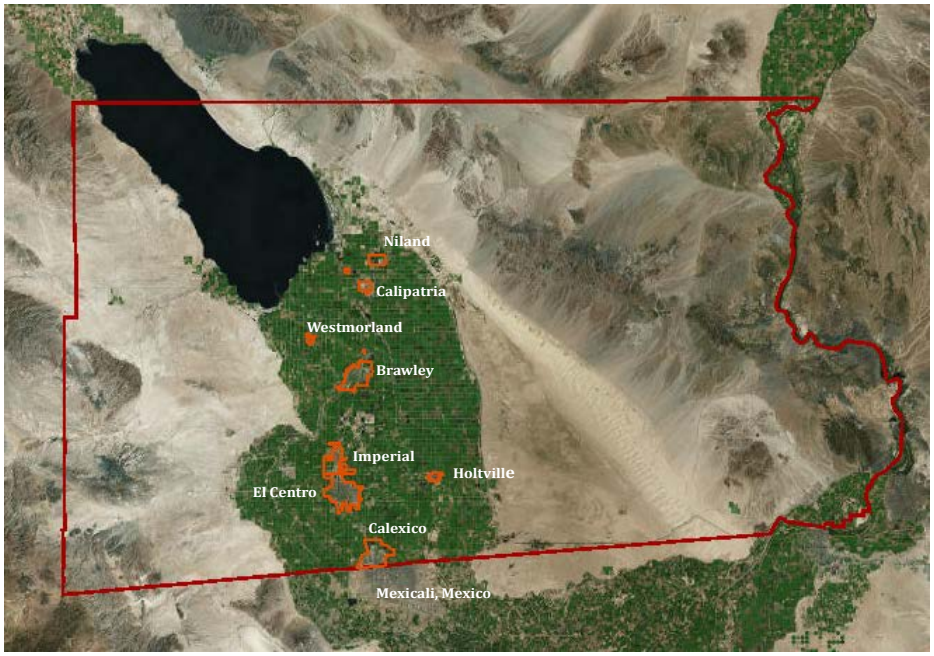


Fig 2-6: Depicts the seven incorporated cities within Imperial Valley - City of Calipatria, City of Westmorland, City of Brawley, City of Imperial, City of El Centro, City of Holtville, and the City of Calexico. Niland is unincorporated. Mexicali, Mexico is to the south

FIGURE 2-7
DESERTS IN CALIFORNIA, YUMA AND MEXICO

Fig 2-7: Depicts the Sonoran Desert as it extends from Mexico into Imperial County. Source: Google Earth Terra Matrics

The air quality and meteorological monitoring stations used in this demonstration are shown in **Figure 2-8**. Of the five SLAMS within Imperial County, four stations measure both meteorological and air quality data. These SLAMS are located in Calexico, El Centro, Westmorland, and Niland; the station located in Brawley only measures air quality. Other air monitoring stations measuring air quality and meteorological data used for this demonstration include stations in eastern Riverside County, southeastern San Diego County and southwestern Arizona (Yuma County) (**Figure 2-8 and Table 2-1)**.

As mentioned above, the PM_{10} exceedance on October 1, 2015 occurred at the Niland station. The Brawley, Niland and Westmorland stations are regarded as the "northern" monitoring sites within the Imperial County air monitoring network. In order to properly analyze the contributions from meteorological conditions occurring on October 1, 2015 other meteorological sites were used in this demonstration which include airports in eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), Imperial County, and other sites relevant to the wind event, such as within northern Mexico. (**Figure 2-8)**.

FIGURE 2-8
MONITORING SITES IN AND AROUND IMPERIAL COUNTY

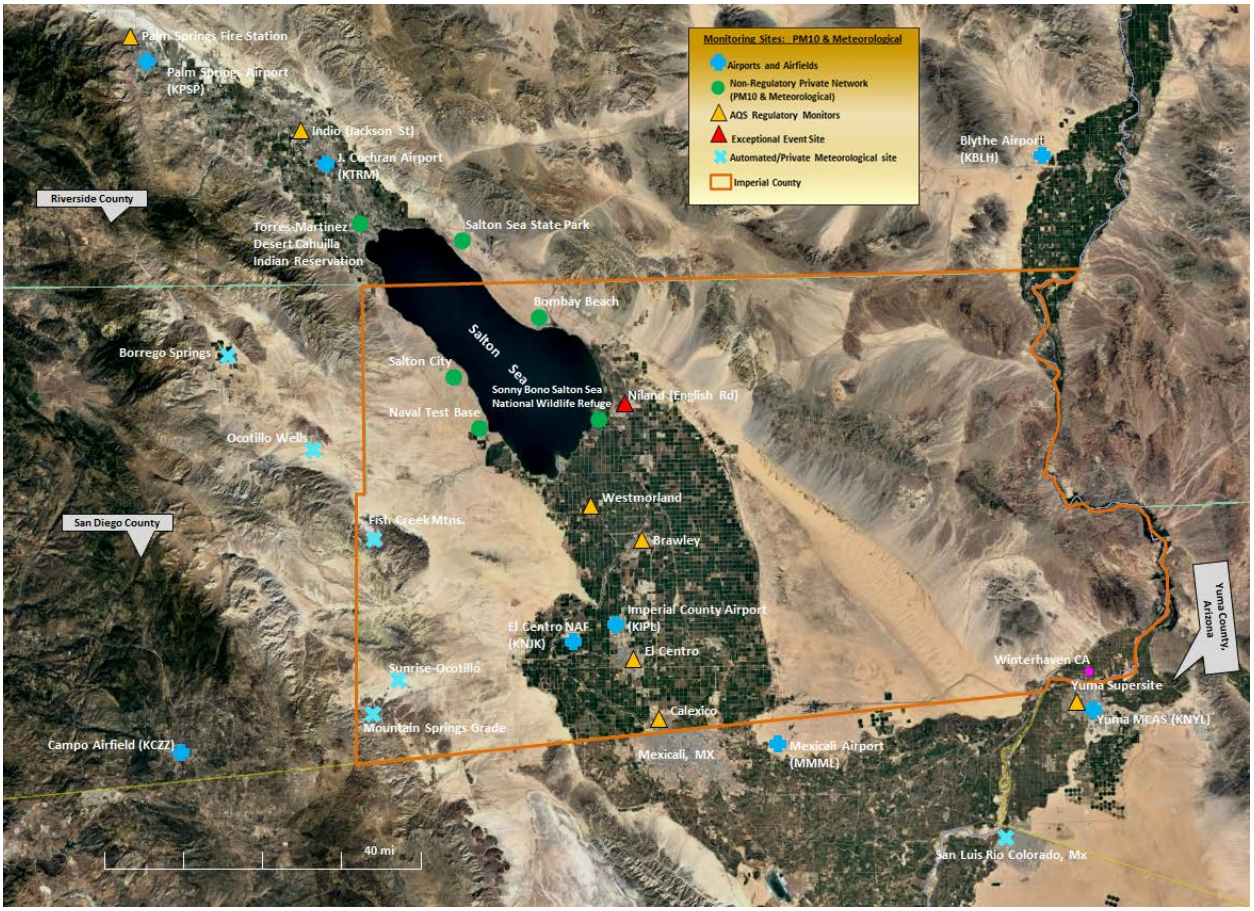


Fig 2-8: Depicts a select group of meteorological and PM_{10} monitoring sites in Imperial County, eastern Riverside County, southeastern San Diego County, southwestern Arizona (Yuma County), and northern Mexico. The image provides the location of potential sites used to gather data in support of an Exceptional Event Demonstration. Source: Google Earth

In addition to meteorological sites, there are non-regulatory PM_{10} sites located around the Salton Sea that maybe referenced as an aid to help the reader understand the direction and velocity of winds that affect Imperial County. Unless, otherwise specifically indicated concentration references do not imply emissions from the surrounding playa of the Salton Sea. Three sites, in specific, are the Salton City air monitoring station, the Naval Test Base air monitoring station and the Sonny Bono air monitoring station. These privately owned stations are non-regulatory (**Figures 2-9 to 2-12**). The Salton City station is located 33.27275°N latitude and 115.90062˚W longitude, on the western edge of the Salton Sea (**Figure 2-9**). The station abuts a water reservoir along the Salton Sea with surrounding chaparral vegetation and unpaved open areas and roads. The Naval Test Base station is located 33.16923°N latitude and 115.85593˚W longitude, on the southwestern edge of the Salton Sea (**Figure 2-11**). The station sits on an abandoned US Military site, still owned by the Department of Defense. Unlike the Salton City station, light chaparral

vegetation and sandy open dune areas surround the Naval Test Base station. Directly to the west of the station is an orchard. The Sonny Bono station is located 33.17638°N latitude and 115.62310˚W longitude, on the southern portion of the Salton Sea within the Sonny Bono Salton Sea Wildlife Refuge. The Sonny Bono Salton Sea National Wildlife Refuge is 40 miles north of the Mexican border at the southern end of the Salton Sea within the Sonoran Desert. The Refuge has two separate managed units, 18 miles apart. Each unit contains wetland habitats, farm fields, and tree rows. The land of the Salton Sea Refuge is flat, except for Rock Hill, a small, inactive volcano, located near Refuge Headquarters. Bordering the Refuge is the Salton Sea on the north and farmlands on the east, south, and west.

FIGURE 2-9
SALTON CITY AIR MONITORING STATION

Fig 2-9: Depicts the Salton City air monitoring (circled) site operated by a private entity. View site photos at the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-10
SALTON CITY AIR MONITORING STATION
WEST

Fig 2-10: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-11
NAVAL TEST BASE AIR MONITORING STATION

Fig 2-11: Depicts the Naval Test Base air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13603&date=17

FIGURE 2-12
NAVAL TEST BASE AIR MONITORING STATION
WEST

Fig 2-12: Photograph taken by the California Air Resources Board audit team in 2017. The photograph taken from the west facing the probe. https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-13
SONNY BONO AIR MONITORING STATION

Fig 2-13: Depicts the Sonny Bono air monitoring (circled) site operated by a private entity. To view the site photos visit the California Air Resources Board monitoring website at https://www.arb.ca.gov/qaweb/sitephotos.php?site_no=13604&date=17

FIGURE 2-14
SONNY BONO SALTON SEA NATIONAL WILDLIFE REFUGE

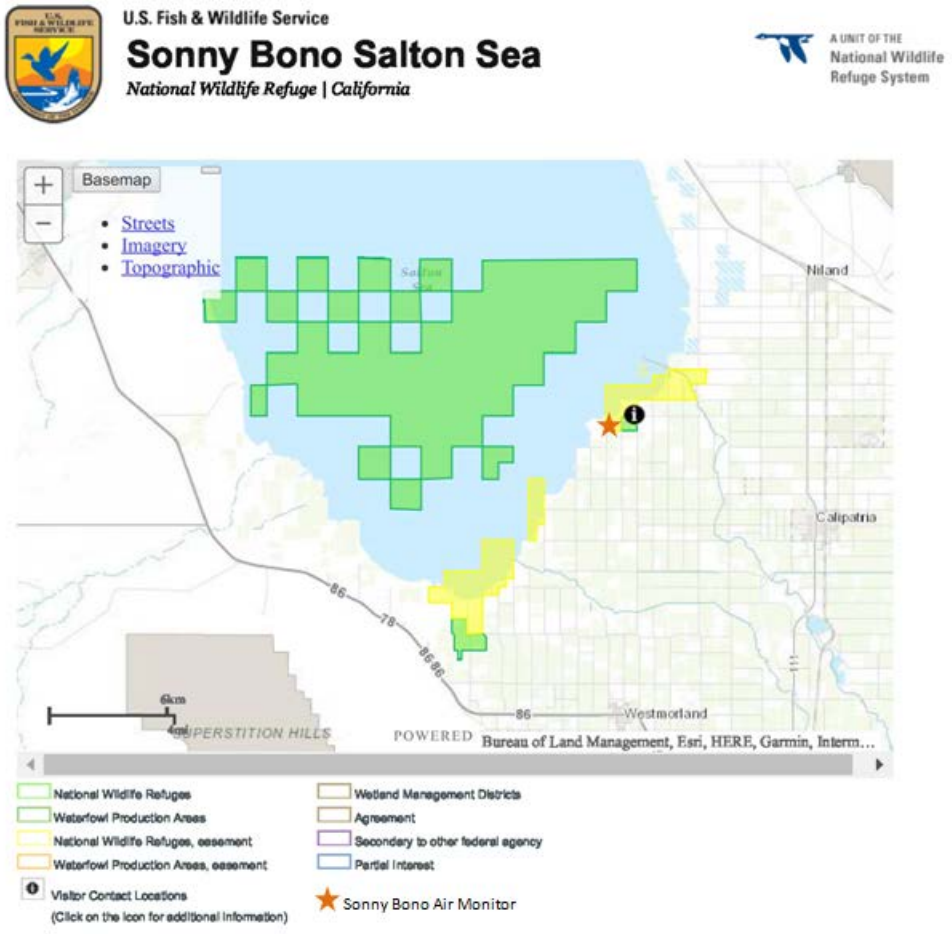


Fig 2-14: The Sonny Bono Wildlife Refuge has about 2,000 acres that are farmed and managed for wetlands. In 1998, the Refuge was renamed after Congressman Sonny Bono, who helped inform the U.S. Congress of the environmental issues facing the Salton Sea as well as acquiring funding for this Refuge to help it respond to avian disease outbreaks and other habitat challenges at the Salton Sea. Source: https://www.fws.gov/refuge/Sonny_Bono_Salton_Sea/about.html

TABLE 2-1
MONITORING SITES IN IMPERIAL COUNTY, RIVERSIDE COUNTY AND ARIZONA
OCTOBER 1, 2015

Monitor Site Name	*Operator	Monitor Type	AQS ID	AQS PARAMETER CODE	ARB Site Number	Elevation (meters)	24-hr PM_{10} ($\mu g/m^3$) Avg	1-hr PM_{10} ($\mu g/m^3$) Max	**Time of Max Reading	Max Wind Speed (mph)	**Time of Max Wind Speed
IMPERIAL COUNTY											
Brawley-Main Street #2	ICAPCD	Hi-Vol Gravimetric	06-025-0007	(81102)	13701	-15	-	-	-	-	-
		BAM 1020					154	890	2200		
Calexico-Ethel Street	CARB	Hi-Vol Gravimetric	06-025-0005	(81102)	13698	3	-	-	-	16	2100
El Centro-9th Street	ICAPCD	Hi-Vol Gravimetric	06-025-1003	(81102)	13694	9	-	-	-	12.5	1900
		BAM 1020					86	419	2200		
Niland-English Road	ICAPCD	Hi-Vol Gravimetr	06-025-4004	(81102)	13997	-57	-	-	-	25	1800
		BAM 1020					171	903	1800		
Westmorland	ICAPCD	Hi-Vol Gravimetric	06-025-4003	(81102)	13697	-43	-	-	-		
		BAM 1020					97.4	479	2100	16	2000
RIVERSIDE COUNTY											
Palm Springs Fire Station	SCAQMD	TEOM	06-065-5001	(81102)	33137	174	24	40	1600	-	-
Indio (Jackson St.)	SCAQMD	TEOM	06-065-2002	(81102)	33157	1	38	97	0700	-	-
ARIZONA – YUMA											
Yuma Supersite	ADEQ	TEOM	04-027-8011	(81102)	N/A	60	52	159	1700	-	-

*CARB = California Air Resources Board
*ICAPCD = Air Pollution Control District, Imperial County
*SCAQMD = South Coast Air Management Quality District
*ADEQ =Arizona Department of Environmental Quality

***Time represents the actual time/hour of the measurement in question according to the zone time (PST unless otherwise noted)

II.2 Climate

As mentioned above, Imperial County is part of the Colorado Desert, which is a subdivision of the larger Sonoran Desert (**Figure 2-15**) encompassing approximately 7 million acres (28,000 km^2). The desert area encompasses Imperial County and includes parts of San Diego County, Riverside County, and a small part of San Bernardino County.

FIGURE 2-15
SONORAN DESERT REGION

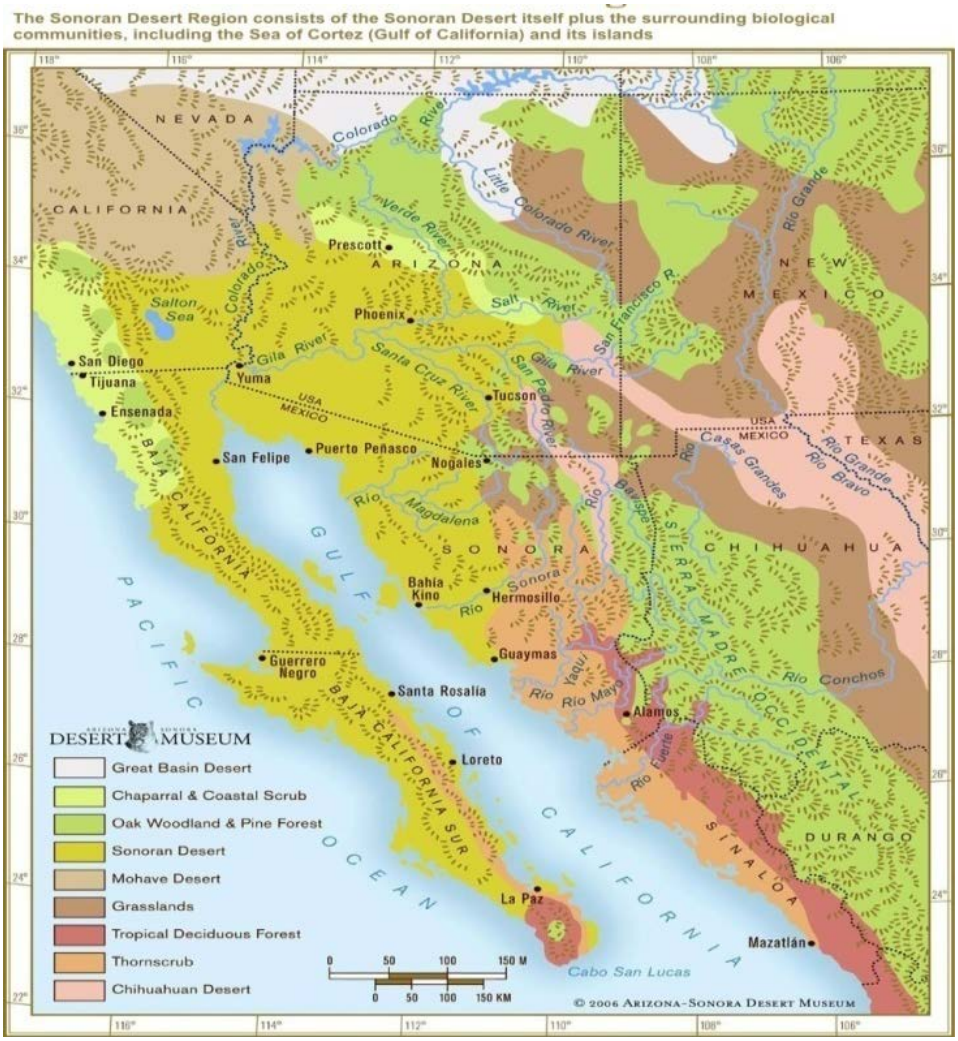


Fig 2-15: Depicts the magnitude of the region known as the Sonoran Desert. Source: Arizona-Sonora Desert Museum at http://desertmuseum.org/center/map.php

The majority of the Colorado Desert lies at a relatively low elevation, below 1,000 feet (300 m), with the lowest point of the desert floor at 275 feet (84 m) below sea level at the Salton Sea. Although the highest peaks of the Peninsular Range reach elevations of nearly 10,000 feet (3,000 m), most of the region's mountains do not exceed 3,000 feet (910 m).

In the Colorado Desert (Imperial County), the geology is dominated by the transition of the tectonic plate boundary from rift to fault. The southernmost strands of the San Andreas Fault connect to the northern-most extensions of the East Pacific Rise. Consequently, the region is subject to earthquakes, and the crust is being stretched, resulting in a sinking of the terrain over time.

The Colorado Desert's climate distinguishes it from other deserts. The region experiences greater summer daytime temperatures than higher-elevation deserts and almost never experiences frost. In addition, the Colorado Desert experiences two rainy seasons per year (in the winter and late summer), especially toward the southern portion of the region which includes a portion of San Diego County. The Colorado Desert portion of San Diego County receives the least amount of precipitation. Borrego Springs, the largest population center within the San Diego desert region averages 5 inches of rain with a high evaporation rate. By contrast, the more northerly Mojave Desert usually has only winter rains.

The west coast Peninsular Ranges, or other west ranges, of Southern California–northern Baja California, block most eastern Pacific coastal air and rains, producing an arid climate. Other short or longer-term weather events can move in from the Gulf of California to the south, and are often active in the summer monsoons. These include remnants of Pacific hurricanes, storms from the southern tropical jet stream, and the northern Inter Tropical Convergence Zone (ITCZ).

The arid nature of the region is demonstrated when historical annual average precipitation levels in Imperial County average 3.11" (**Figure 2-16)**. During the 12-month period prior to October 1, 2015, Imperial County measured total annual precipitation of 2.37 inches. Such arid conditions, as those preceding the event, result in soils that are particularly susceptible to particulate suspension by the elevated gusty winds.

FIGURE 2-16
IMPERIAL COUNTY HISTORICAL WEATHER

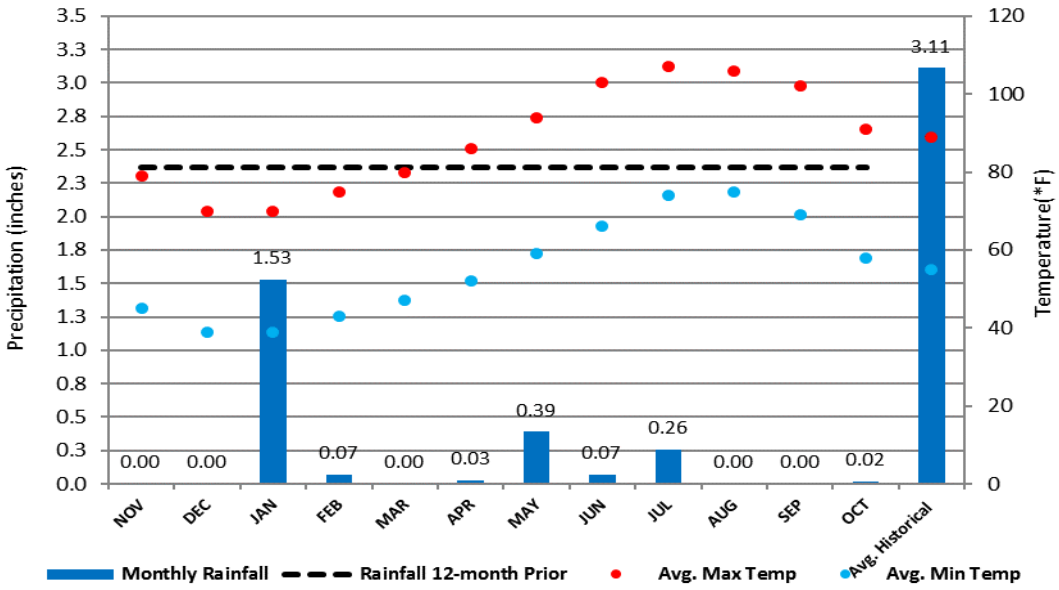


Fig 2-16: Historical Imperial County weather. Prior to October 1, 2015, the region suffered abnormally low total annual precipitation of 2.37 inches. Average annual precipitation is 3.11 inches. Meteorological data courtesy of Western Regional Climate Center (WRCC) and Weather Underground https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca2713

The NWS explains that the speed of any wind resulting from a weather system is directly proportional to the change in air pressure, called a pressure gradient, such that when the pressure gradient increases so does the speed of the wind.[4] Because the pressure gradient is just the difference in pressure between high and low pressure areas, changes in weather patterns may recur seasonally.

Typically, high pressure brings clear skies and with no clouds, there is more incoming shortwave solar radiation causing temperatures to rise. When surface winds become light, the cooling of the air produced directly under a high-pressure system can lead to a buildup of particulates in urban areas under an elongated region of relatively high atmospheric pressure or ridge causing widespread haze. Conversely, a trough is an elongated region of relatively low atmospheric pressure often associated with fronts. Troughs may be at the surface, or aloft under various conditions. Most troughs bring clouds, showers, and a wind shift, particularly following the passage of the trough.

While windblown dust events in Imperial County during the summer monsoon season are often due to outflow winds from thunderstorms, windblown dust events in the fall, winter, and spring are usually due to strong winds associated with low-pressure systems and cold fronts moving southeast across California. These winds are the result of strong surface pressure gradients between the approaching low-pressure system, accompanying cold front, and higher pressure ahead of it. As the low-pressure system and cold front approaches and passes, gusty southwesterly winds typically shift to northwesterly causing variable west winds. These strong winds entrain dust into the atmosphere and transport it over long distances, especially when soils are arid.

II.3 Event Day Summary

The exceptional event for October 1, 2015, caused when the first of two low-pressure systems moving through California boosted the onshore flow produced locally strong westerly winds within the San Diego Mountains and deserts. As early as September 29, 2015 the San Diego NWs office discussed two low-pressure troughs that would affect California on Thursday October 1, 2015 and Sunday October 4, 2015. The first low pressure trough, located off the Northern California coast spun southwest flow across Southern California eventually moving east through Northern California and Nevada on Thursday, October 1, 2015. The second low, described as taking aim at California by Sunday, October 4, 2015 started out in British Columbia and moved southward exactly following the west coast. The NWS office in Phoenix discussed the two systems Wednesday, September 30, 2015, as lowering heights out west and tightening gradients across Southern California and Western Arizona. By October 1, 2015, the Phoenix NWS office described a cooling in response to an approaching low-pressure system centered off the Northern California coast during the early morning hours. The Phoenix office explained that as the system moves eastward, across the western states not only would it displace the ridge but

[4] NWS JetStream – Origin of Wind http://www.srh.noaa.gov/jetstream/synoptic/wind.html

also bring elevated wind speeds for the afternoon and evening hours, especially over Southeast California.

On October 1, 2015, as the first of two low-pressure systems moved eastward across the western states gust westerly winds blew over and through the San Diego mountains and desert and into Imperial County affecting air quality and causing an exceedance at the Niland monitor.

Figures 2-17 through 2-19 provide information regarding the position of the low-pressure trough along with the tightening pressure gradient and elevated winds.

FIGURE 2-17
UPPER LEVEL LOW MOVES INLAND

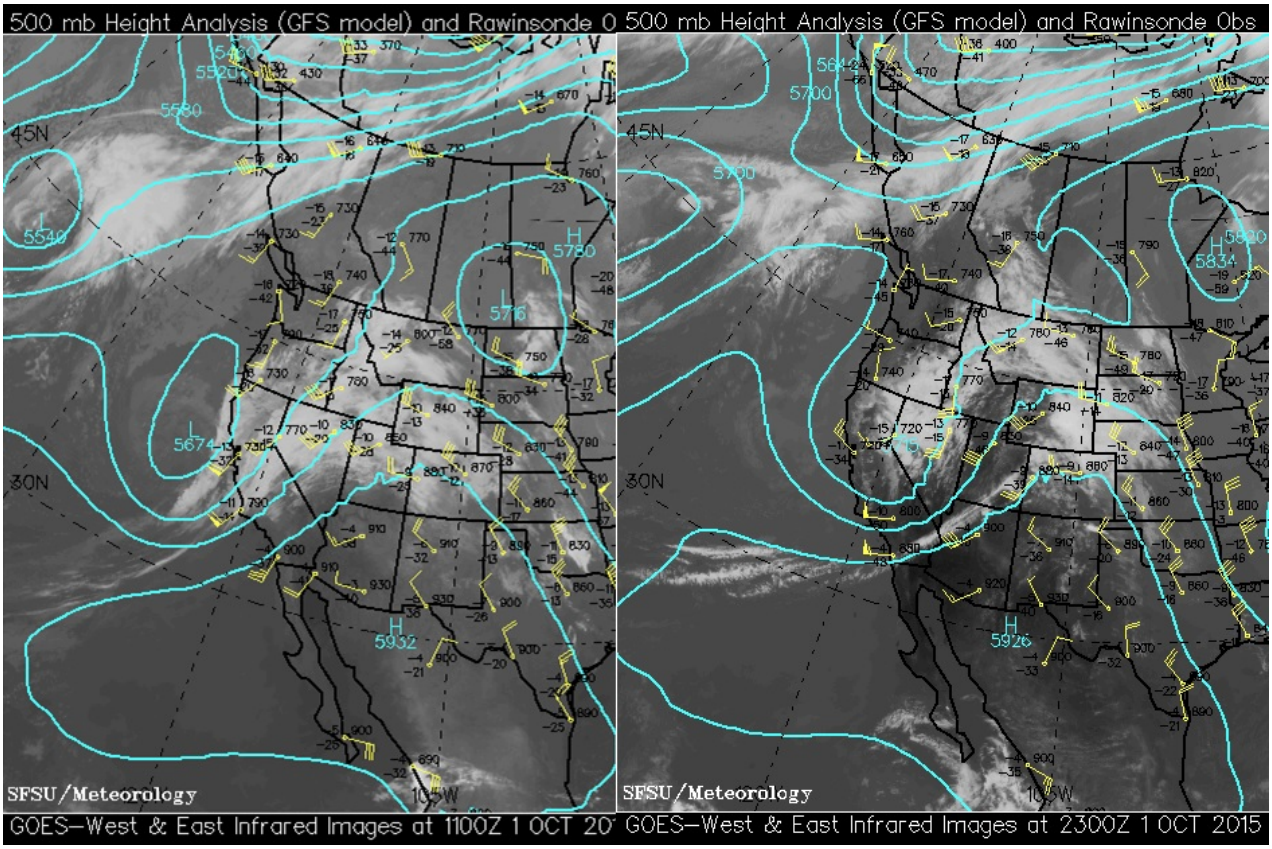


Fig 2-17: Two 500mb height maps show the upper level low moving inland (right, 0300 PST and left, 1500 PST). Source: http://virga.sfsu.edu/archive/composites/sathts_500/1510

FIGURE 2-18
SOUTHWESTERLY WINDS OVER SE CALIFORNIA

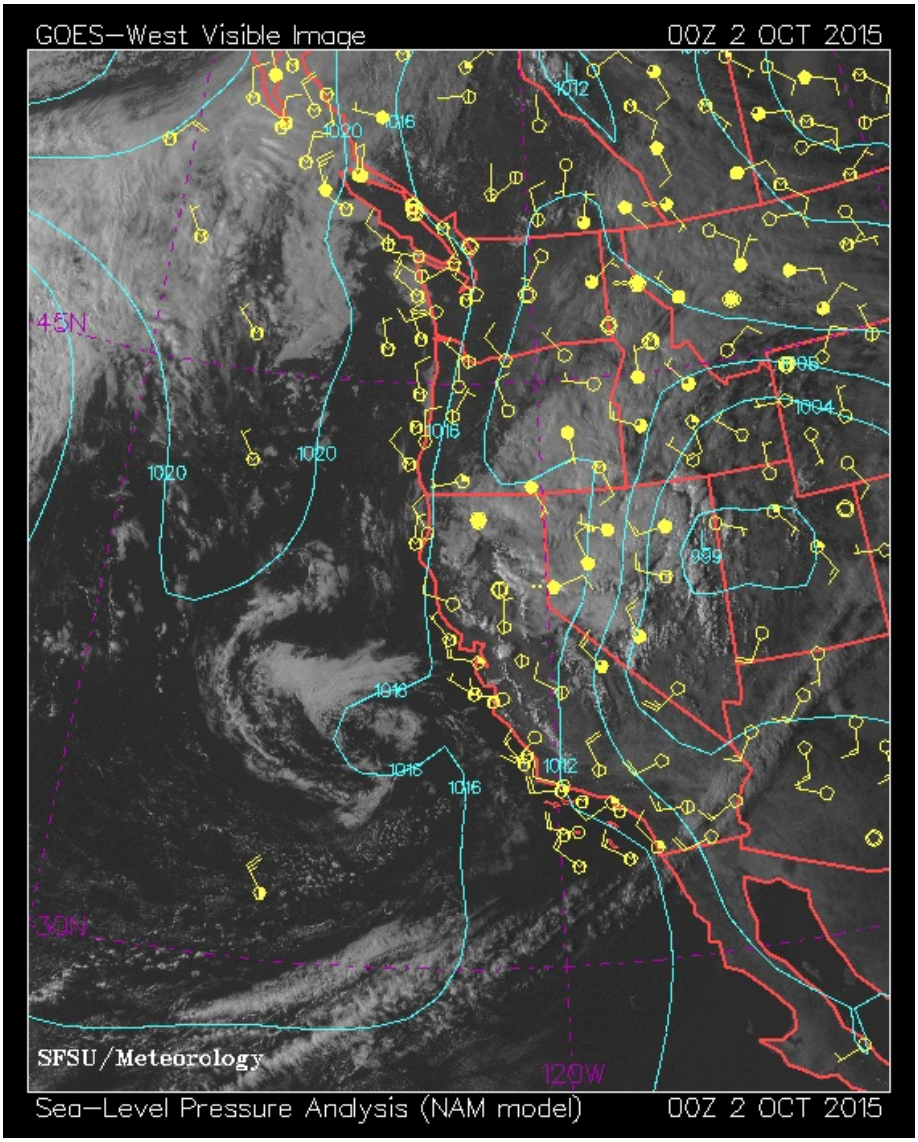


Fig 2-18: A GOES-W visible sea-level pressure analysis image (1600 PST) shows moderately strong WSW-SW winds over southeast California. Winds barbs indicate winds of ~23 mph. In actuality, winds reached 25 mph. Source: SFSU Department of Earth and Climate Sciences and the California Regional Weather Server

FIGURE 2-19
SURFACE GRADIENT TIGHTENS

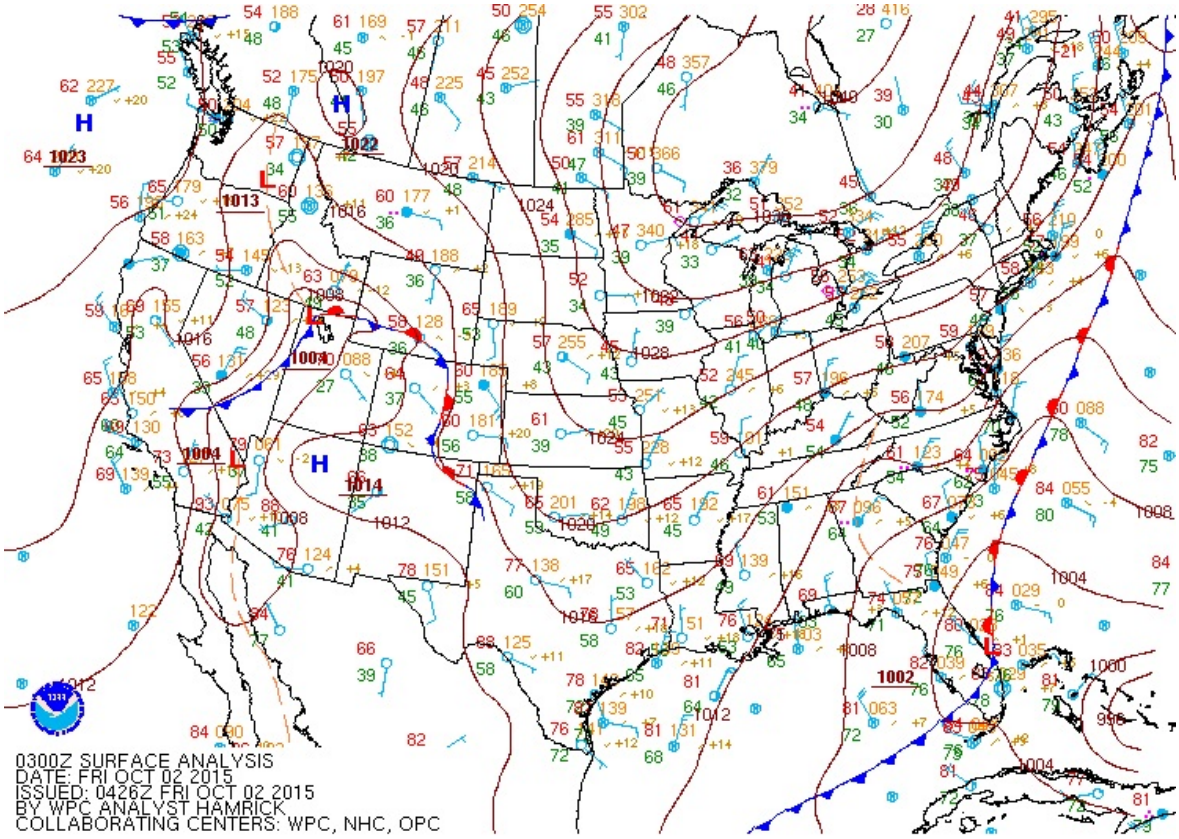


Fig 2-19: As the low-pressure trough over CA-NV-AZ-UT developed the surface pressure gradient across southeast California (1900 PST) tightened. Source: http://www.wpc.ncep.noaa.gov/archives

As mentioned above, a couple of low-pressure systems affected the Western states, the first system moved through the area Thursday, October 1, 2015 and brought gusty westerly winds through the San Diego Mountains and deserts. The San Diego NWS office evening Areas Forecast disclosed reported wind gust of 25 to 30 mph within several locations in the mountains as early as 710pm PST.[5] Wind direction during this first system plays an important role when analyzing the elevated concentrations. While there will be additional discussion regarding the direction of the winds in section V, the timing of the elevated winds is important here. Both local airports began measuring elevated winds, with the El Centro Naval Air Facility (NAF) (KNJK) consistently higher than the Imperial County Airport, at 1253 and 1256 PST, respectively. While measured wind speeds at KIPL remained moderate to strong KNJK measured strong to moderate wind speeds. Both airports measured westerly winds with KIPL measuring variable west winds between WSW to WNW and W and KNJK measured six hours of SW winds, coincident with the strongest wind speeds and six hours of W winds coincident with the strong to moderate level winds.

[5] San Diego NWS office Area Forecast, 810pm PST (910pm PDT) Thursday, October 1, 2015. (**Appendix A**)

The variability of the winds, not the strength of the winds created conditions conducive to intermittent elevated levels of PM_{10} concentrations at all the air monitors. Both the Brawley and Niland monitors measured 8 hours of elevated PM_{10} concentrations while the Westmorland and El Centro monitors measured less than 8 hours coincident with the strong to moderate wind speeds on October 1, 2015. **Figure 2-20** is a graphical illustration of the conditions that existed for the October 1, 2015 event.

FIGURE 2-20
RAMP UP ANALYSIS OCTOBER 1, 2015

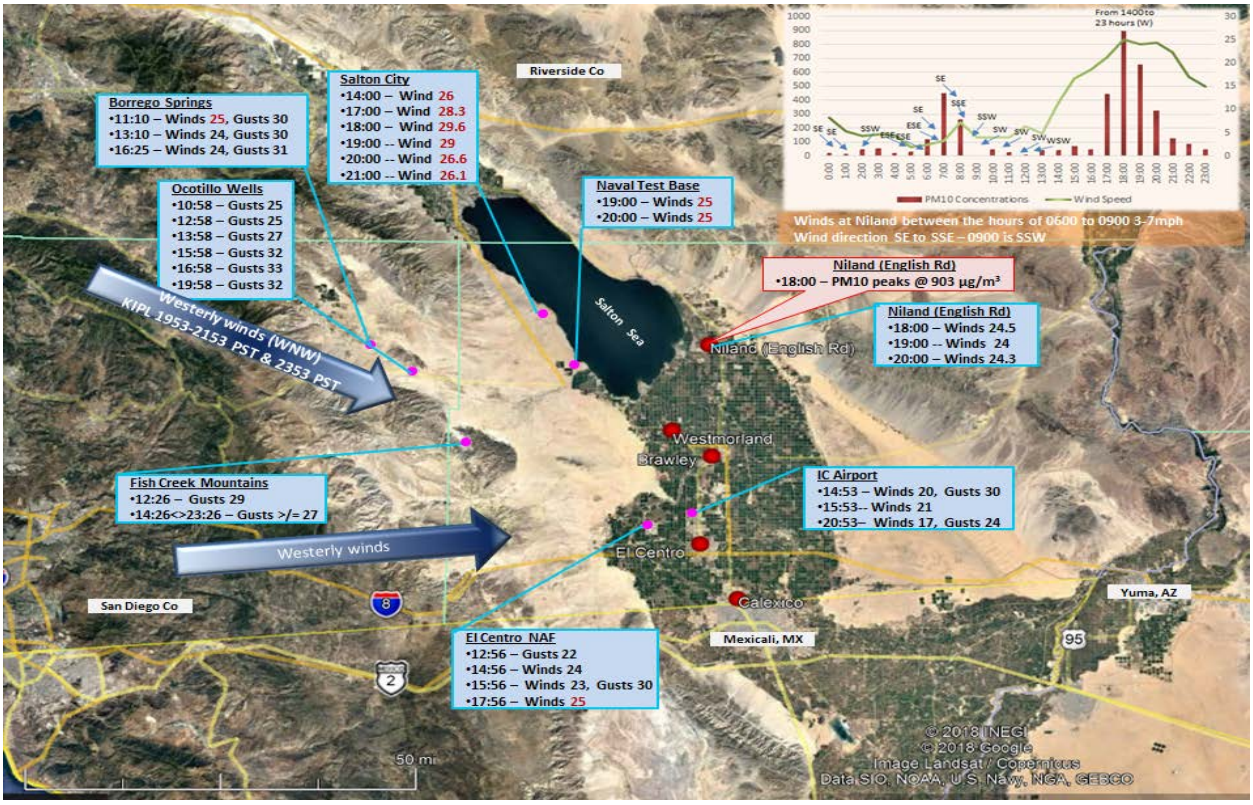


Fig 2-20: Variable and light easterly to southerly winds during the morning hours of October 1, 2015. By early afternoon winds elevate and continue as moderate to strong winds through the evening hours. Google Earth base map. Air quality data from the EPA's AQS data bank. Wind data for KNJK from the NCEI's QCLCD system. Salton Sea wind from AQMIS

Table 2-2 contains a summary of maximum winds, peak wind gusts, and wind direction at monitors in Imperial County, eastern Riverside County, Yuma County, Arizona, and Mexicali. For detailed meteorological station, graphs see **Appendix B**.

TABLE 2-2
WIND SPEEDS ON OCTOBER 1, 2015

Station Monitor Airport Meteorological Data	Maximum Wind Speed (WS) (mph)	Wind Direction during Max WS (degrees)	*Time of Max Wind Speed	24 hr Maximum Wind Gust (WG) (mph)	Time of Max WG	PM_{10} correlated to time of Max Wind Speed	
						Nlnd	Brly
IMPERIAL COUNTY							
Imperial Airport (KIPL)	21	250	1553	30	1453	72	204
Naval Air Facility (KNJK)	25	250	1756	30	1556	451	68
Calexico (Ethel St)	16	305	2100	-	-	132	459
El Centro (9th Street)	12.5	282	1900	-	-	659	461
Niland (English Rd)	24.5	262	1800	-	-	903	222
Westmorland	16	279	2000	-	-	332	454
RIVERSIDE COUNTY							
Blythe Airport (KBLH)	18	240	1452	25	1452	45	129
Palm Springs Airport (KPSP)	20	320	1753	30	1753	451	68
Jacqueline Cochran Regional Airport (KTRM) - Thermal	16	350	2252	25	2252	91	890
ARIZONA - YUMA							
Yuma MCAS (KNYL)	14	310	2057	20	2157	132	459
MEXICALI - MEXICO							
Mexicali Int. Airport (MXL)	21.9	270	1700	-	-	451	68

*All time is in PST unless otherwise stated

National Oceanic and Atmospheric Administration (NOAA) Air Resources Laboratory HYSPLIT back trajectory model [6], **Figures 2-21 and 2-22**, illustrates the path of airflow as it travelled from the mountains and natural open desert areas ending at 1800 PST, 2300 PST and 0800 PST. The 1800 PST hour is coincident with the peak concentration at the Niland monitor while the 2300 PST hour is coincident with the elevated concentrations at all monitors. Elevated winds blew throughout the afternoon and evening hours on October 1m 2015. The 0800 PST hour is coincident with the brief morning elevated concentrations at the Niland monitor, which allowed the Niland monitor to exceed the NAAQS. Absent the elevated concentrations during the morning, the Niland monitor would not have exceeded the NAAQS.

Both trajectories provide information regarding the path of airflow during the morning and afternoon hours. The first back trajectory confirms the west wind direction measured at local airports and at the Niland monitor through the afternoon to evening hours. Although all

[6] The Hybrid Single Particle Lagrangian Integrated Trajectory Model (**HYSPLIT**) is a computer model that is a complete system for computing simple air parcel trajectories to complex dispersion and deposition simulations. It is currently used to compute air parcel trajectories and dispersion or deposition of atmospheric pollutants. One popular use of HYSPLIT is to establish whether high levels of air pollution at one location are caused by transport of air contaminants from another location. HYSPLIT's back trajectories, combined with satellite images (for example, from NASA's MODIS satellites), can provide insight into whether high air pollution levels are caused by local air pollution sources or whether an air pollution problem was blown in on the wind The initial development was a result of a joint effort between NOAA and Australia's Bureau of Meteorology. Source: NOAA/Air Resources Laboratory, 2011.

monitors in Imperial County measured elevated concentrations as early as 1400 PST coincident with elevated wind speeds only the Niland monitor exceeded.

The second trajectory illustrates the variability or the erratic nature of the airflow during the morning hours of October 1, 2015. While the trajectory clearly illustrates the lower level airflow from the southeast during the morning hours of October 1, 2018, measured winds during the morning hours at the Niland station ranged between 2 mph and 8.2 mph indicating variability. The variability of the wind alone is insufficient to explain the three hours of elevated concentrations at the Niland monitor. The NWS utilizes the Haines Index to forecast the potential for erratic fires, caused by unstable and dry air.[7] Such an analysis can provide some insight into the nature of the air parcel around the Niland site. According to the NWS, there were indications that the air was sufficiently dry and unstable in nature, which would have allowed any normal controlled activity such as driving on a graveled road to amplify the affect upon the Niland monitor. The Phoenix NWS office issued its Fire Weather Planning Forecast, which indicated the expectation of light south and southeast winds during the early hours of Thursday, October 1, 2015 and a Haines High Level Index of 5 or moderate, indicating a potential for a large plume dominated fire growth in Imperial County. Such an indication indicates sufficient unstable and dry air at the Niland monitor. As a result, combined with the afternoon to evening elevated winds, the early morning elevated concentrations measured at the Niland monitor resulted when southeasterly winds elevated particulate matter providing the conditions that allowed an exceedance at the Niland monitor.

Data used in the HYSPLIT model has a horizontal resolution of 12 km and is integrated every three hours. Thus, the HYSPLIT model may differ from local observed surface wind speeds and directions. The elevated levels of PM_{10} concentrations measured in Riverside, Imperial, and Yuma counties illustrate the regional nature of the event (**Tables 2-1 and 2-2**).

[7] **Haines Index** (also known as Lower Atmosphere Severity Index) is a weather index developed by meteorologist Donald Haines in 1988 that measures the potential for dry, unstable air to contribute to the development of large or erratic wildland fires. The index is derived from the stability (temperature difference between different levels of the atmosphere) and moisture content (dew point depression) of the lower atmosphere. These data may be acquired with a radiosonde or simulated by a numerical weather prediction model. The index is calculated over three ranges of atmospheric pressure: low elevation (950-850 millibars (mb)), mid elevation (850-700 mb), and high elevation (700-500 mb). A Haines Index of 6 means a high potential for an existing fire to become large or exhibit erratic fire behavior, 5 means medium potential, 4 means low potential, and anything less than 4 means very low potential.

FIGURES 2-21
HYSPLIT MODEL ENDING 1800 PST AND 2300 PST

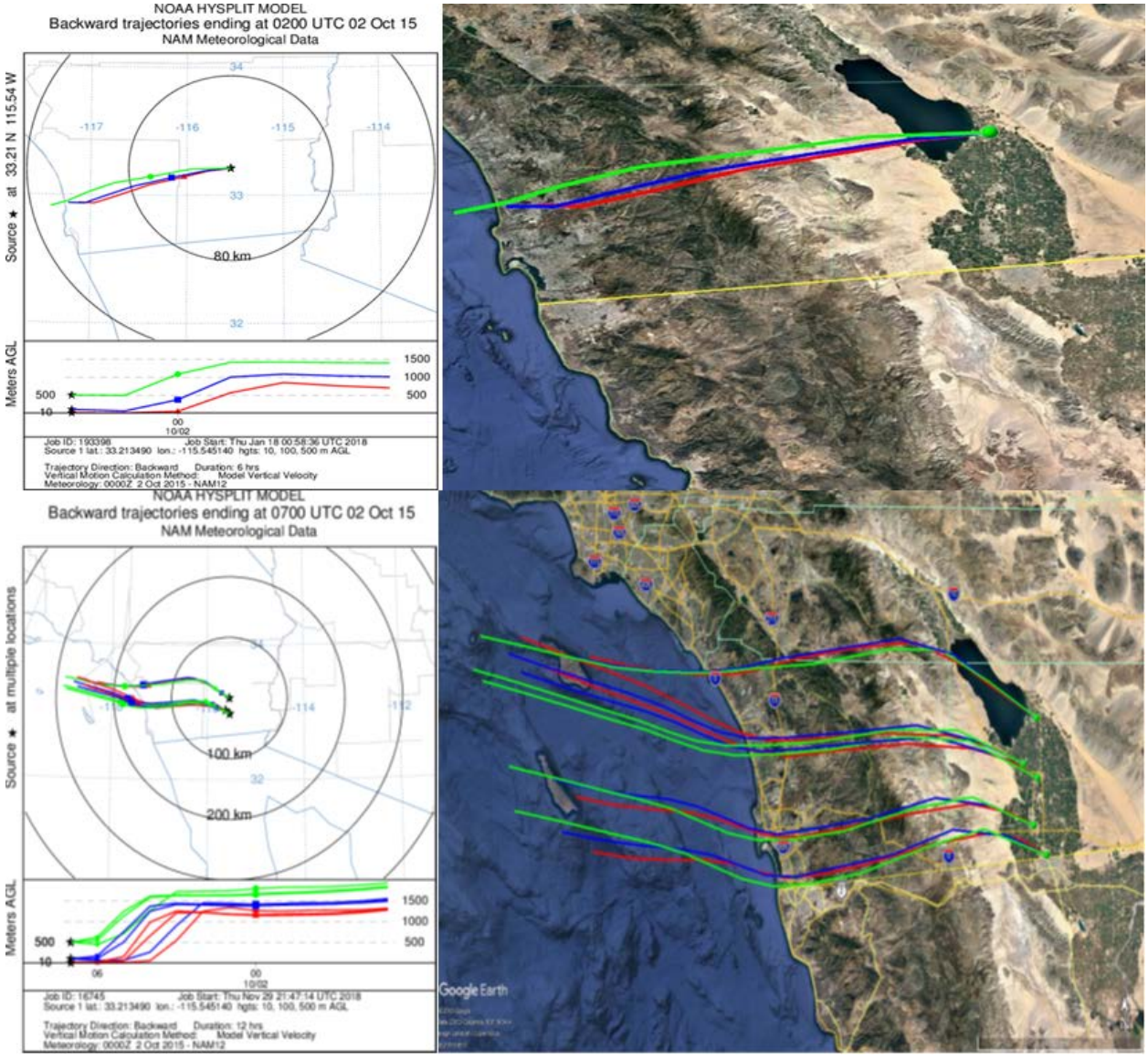
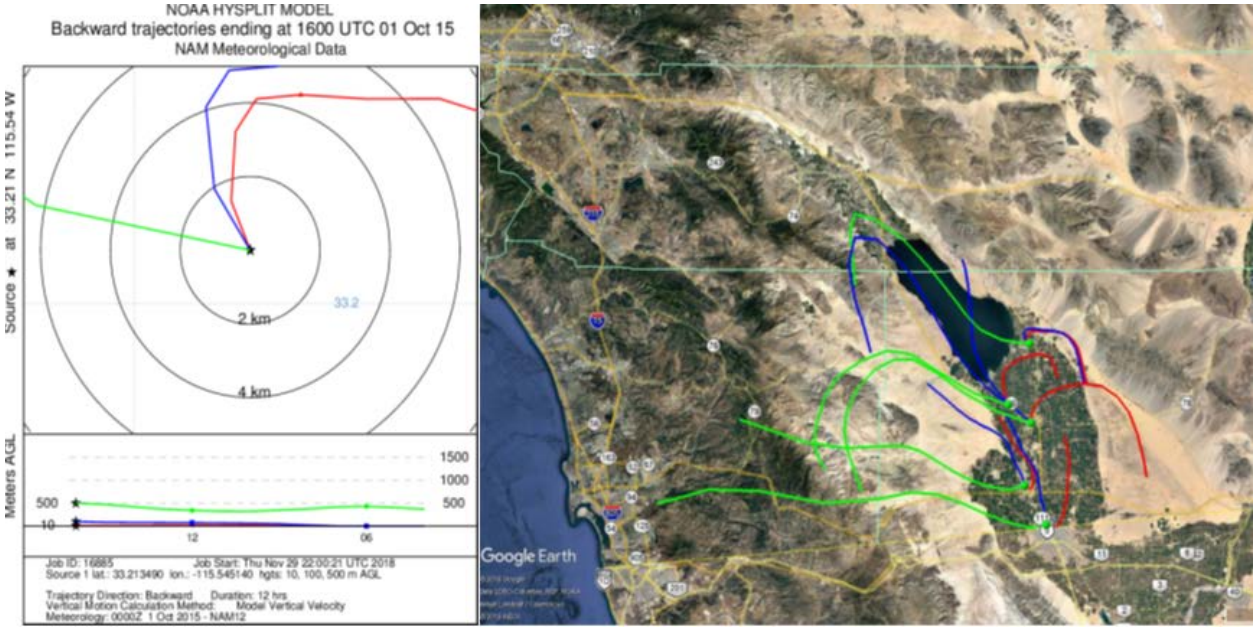


Fig 2-21: A 12-hour HYSPLIT back-trajectory ending at 1800 PST and 2300 PST at monitors on October 1, 2015. The top two images represent the Niland monitor while the bottom two images include the all monitors. Specifically, on the bottom left the image only includes Brawley, Niland and Westmorland since the Calexico and El Centro back-trajectories were difficult to combine. The base map to the bottom right includes all monitors in Imperial County. The red trajectory represents airflow at 10 meters AGL (above ground level); blue represents airflow at 100m AGL; green represents airflow at 500m AGL. Generated through NOAA Air Resources Laboratory. Google Earth base map

FIGURES 2-22
HYSPLIT MODEL ENDING 0800 PST



Figs 2-22: A 12-hour HYSPLIT back-trajectory ending at 0800 PST at Niland. The image on the right is the same trajectory but uses a base map and includes all the monitors. The red trajectory represents airflow at 10 meters AGL (above ground level); blue represents airflow at 100m AGL; green represents airflow at 500m AGL. Generated through NOAA Air Resources Laboratory. Google Earth base map

Figures 2-23 and 2-24 illustrate the elevated levels of wind speeds and hourly PM_{10} concentrations measured in Riverside, Imperial, and Yuma counties.[8] Elevated emissions entrained into Imperial County affected the Niland monitor when gusty west winds, associated with the passage of a low-pressure system during the afternoon to evening hours of October 1, 2015. The Niland monitor measured the highest elevated concentrations between 1600 PST and 2300 PST coincident with continual measured wind speeds and gusts above 20mph, with more than one hour at or above 25pmh.

The resulting entrained dust and accompanying high winds from the system qualify this event as a "high wind dust event".[9] High wind dust events are considered natural events where the windblown dust is either from solely a natural source or from areas where anthropogenic sources of windblown dust are controlled with Best Available Control Measures (BACM). The following sections provide evidence that the October 1, 2015 high wind event qualifies as a natural event and that BACM was overwhelmed by the suddenness and intensity of the meteorological event.

[8] National Weather Service; NOAA's Glossary – Wind Speed: The rate at which air is moving horizontally past a given point. It may be a 2-minute average speed (reported as wind speed) or an instantaneous speed (reported as a peak wind speed, wind gust, or squall) http://w1.weather.gov/glossary/index.php?letter=w

[9] Title 40 Code of Federal Regulations part 50: §50.1(p) High wind dust event is an event that includes the high-speed wind and the dust that the wind entrains and transports to a monitoring site.

FIGURE 2-23
72 HOUR PM_{10} FLUCTUATIONS VARIOUS SITES

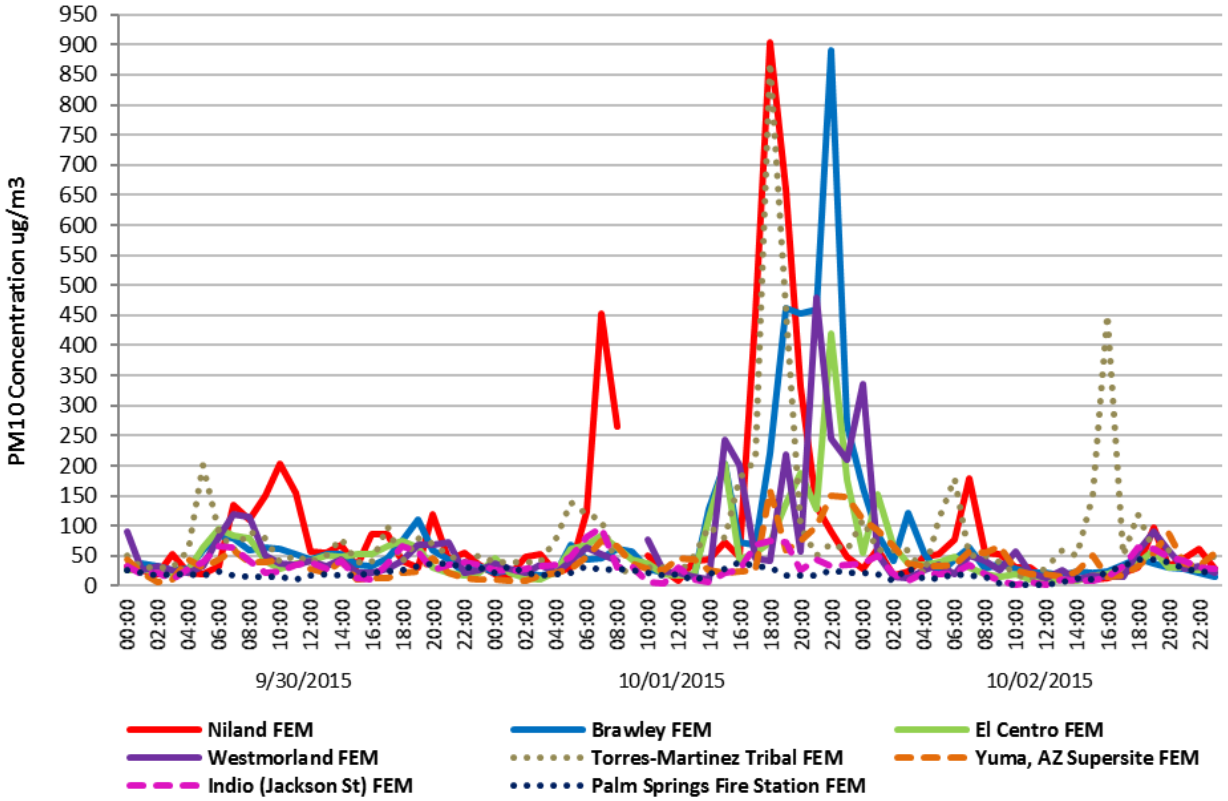


Fig 2-23: Is the graphical representation of the 72-hour relative PM_{10} concentrations at various monitoring locations throughout Riverside, Imperial and Yuma counties. The graph demonstrates that PM_{10} concentrations at all monitors in Imperial County were affected by the weather system and accompanying winds on October 1, 2015. 1600 through 2200 PST is the time coincident with elevated winds and gusts at or above 25 mph. Air quality data from the EPA's AQS data bank

FIGURE 2-24
72 HOUR REGIONAL WIND SPEEDS

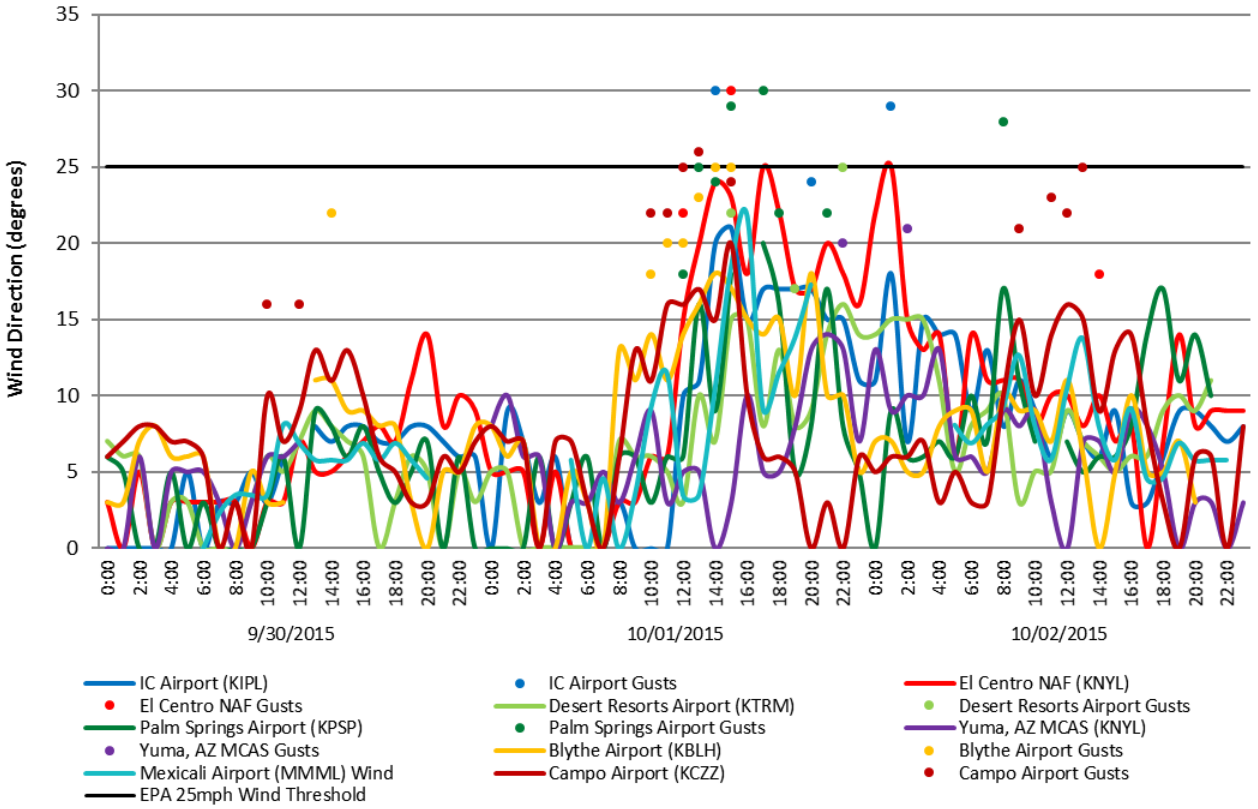


Fig 2-24: Is the graphical representation of the 72 hour measured winds speeds and gusts at various regional airports in California and Arizona. The graph illustrates the number of hours where measured wind speeds and wind gusts were at or above 25 mph. Wind Data from the NCEI's QCLCD system

III Historical Concentrations

III.1 Analysis

While naturally occurring high wind events may recur seasonally and at times frequently and qualify for exclusion under the EER, historical comparisons of the particulate concentrations and associated winds provide insight into the frequency of events within an identified area. The following time series plots illustrate that PM_{10} concentrations measured at the Niland monitor on October 1, 2015, compared to non-event and event days demonstrates the variability over several years and seasons. The analysis also provides supporting evidence that there exists a clear causal relationship between the October 1, 2015 high wind event and the exceedance measured at the Niland monitor.

Figures 3-1 and 3-2 show the time series of available FRM and BAM 24-hr PM_{10} concentrations at the Niland monitor for the period of January 1, 2010 through October 1, 2015. Note that prior to 2013, BAM data was not FEM therefore, not reported into AQS.[10] Properly establishing the variability of the event as it occurred on October 1, 2015, 24-hour averaged PM_{10} concentrations between January 1, 2010 and October 1, 2015 were compiled and plotted as a time series. All figures illustrate that the exceedance, which occurred on October 1, 2015, were outside the normal historical concentrations when compared to event and non-event days. Air quality data for all graphs obtained through the EPA's AQS data bank.

[10] Pollutant concentration data contained in EPA's Air Quality System (AQS) are required to be reported in units corrected to standard temperature and pressure (25 C, 760 mm Hg). Because the PM_{10} concentrations prior to 2013 were not reported into the AQS database all BAM (FEM) data prior to 2013 within this report are expressed as micrograms per cubic meter (mg/m3) at local temperature and pressure (LTP) as opposed to standard temperature and pressure (STP, 760 torr and 25 C). The difference in concentration measurements between standard conditions and local conditions is insignificant and does not alter or cause any significant changes in conclusions to comparisons of PM_{10} concentrations to PM_{10} concentrations with in this demonstration.

FIGURE 3-1
NILAND HISTORICAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 1, 2010 TO OCTOBER 1, 2015

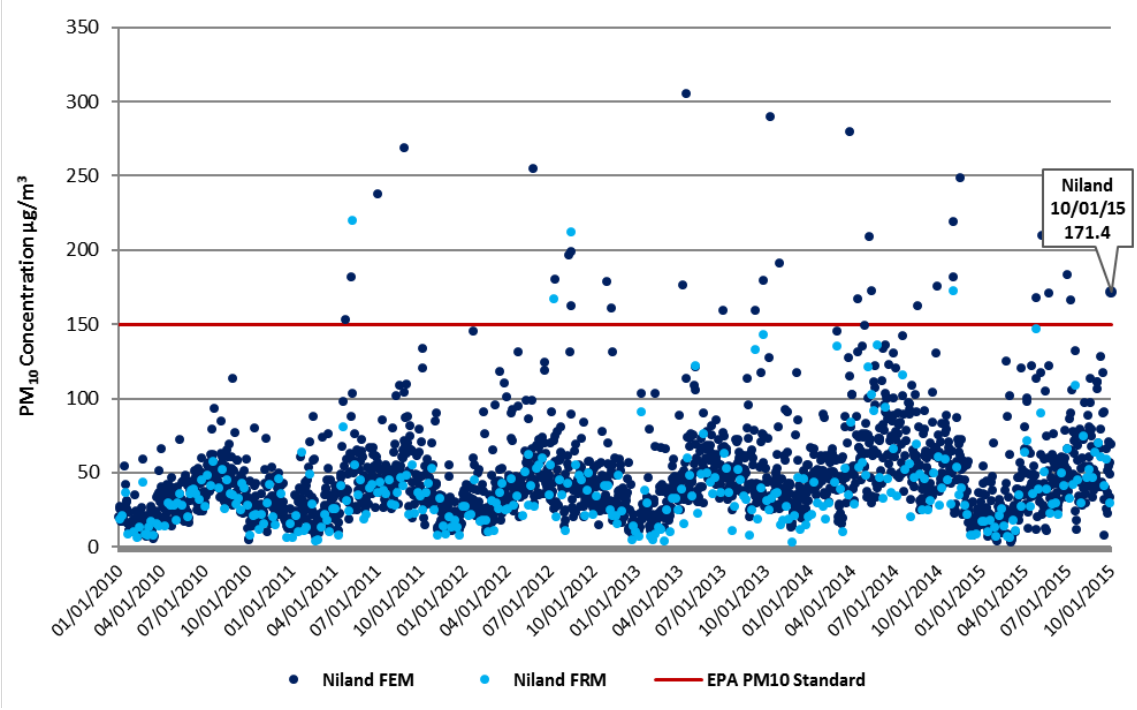
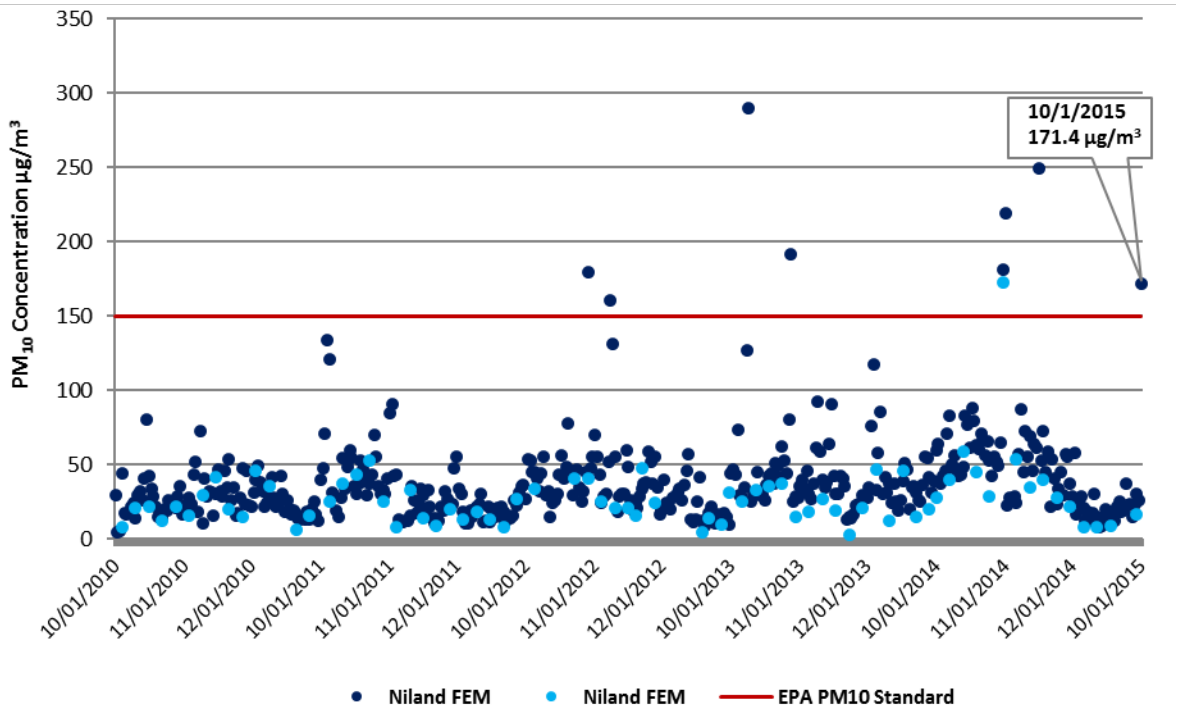


Fig 3-1: A comparison of PM_{10} historical concentrations demonstrates that the measured concentration of 171 µg/m³ on October 1, 2015 by the Niland monitor was outside the normal historical concentrations when compared to similar event days and non-event days. Of the 2100 sampling days there were 35 exceedance days which is less than a 2.0% occurrence rate

The time series, **Figures 3-1 thru 3-2** for Niland included 2,429 credible samples measured between January 1, 2010 and October 1, 2015 or a total 2100 sampling days.

Overall, the time series illustrates that the Niland monitor, measured 35 exceedance days out of the 2100 sampling days, which is less than a 2% occurrence rate. Of the 35 exceedance days, 8 exceedance days occurred during the third quarter (July – September). The remaining 27 exceedance days occurred during the first, second and fourth quarters. The October 1, 2015 concentration is outside the normal historical measurements for the third quarter. No exceedances of the standard occurred during 2010. As mentioned above, FEM BAM data was not regulatory from 2010 to 2012.

FIGURE 3-2
NILAND SEASONAL COMPARISON
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH OCTOBER 1, 2015**



***October 1, 2010 through December 31, 2014 and October 1, 2015**

Fig 3-2: A comparison of PM_{10} seasonal concentrations demonstrate that the measured concentration of 171 µg/m^3 by the Niland monitor on October 1, 2015 was outside the normal seasonal concentrations when compared to similar days and non-event days

Figure 3-2 displays the seasonal fluctuation over 461 sampling days at the Niland monitor for third quarter (July to September) between 2010 and 2015. The Niland monitor measured 533 credible samples over 461 sampling days. Of the 461 sampling days, there were eight (8) measured exceedance days, which equates to less than a 2.0% occurrence rate. The October 1, 2015 measured concentration at the Niland monitor was outside the normal historical and seasonal concentrations when compared to both event days and non-event days.

FIGURE 3-3
NILAND HISTORICAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
JANUARY 2010 TO OCTOBER 1, 2015

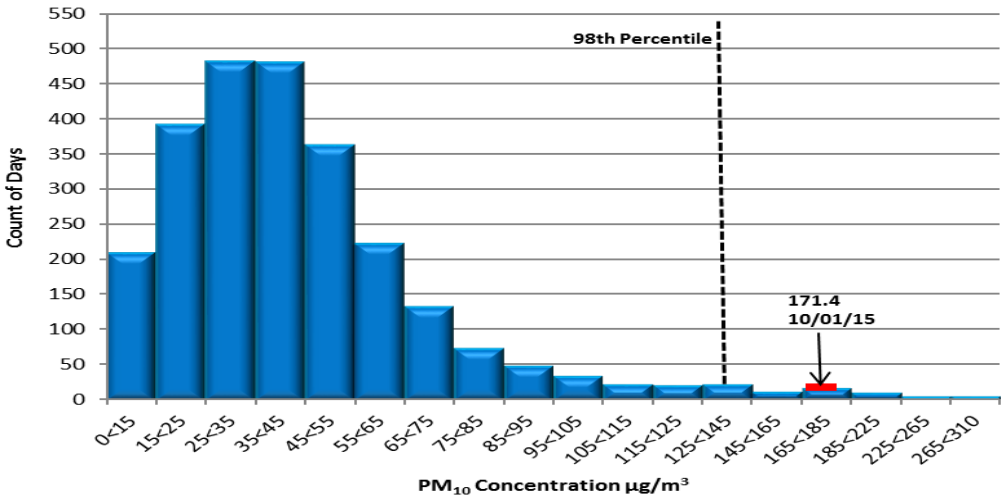
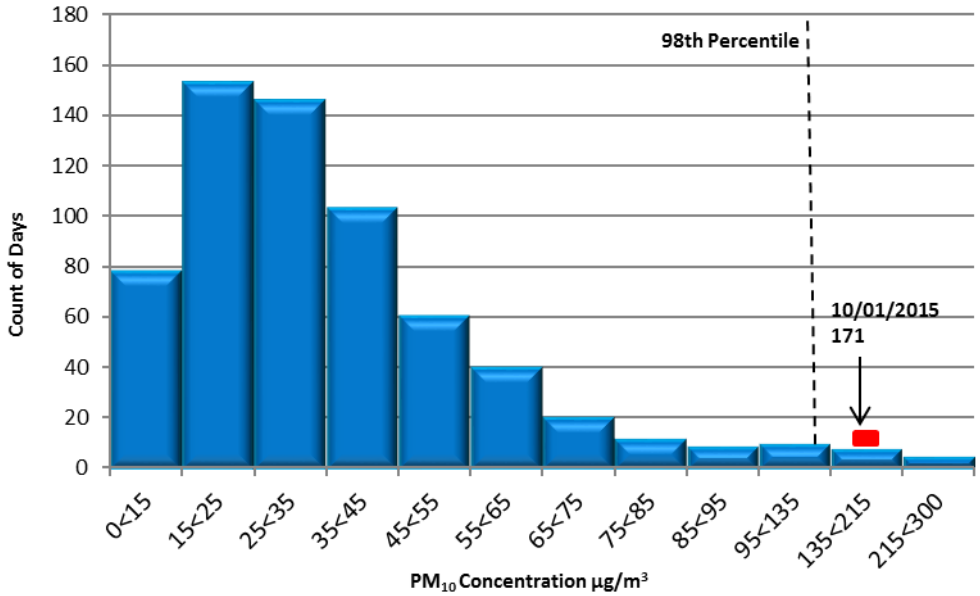


Fig 3-3: The 24-hr average PM_{10} concentrations measured at Niland monitor demonstrates that the October 1, 2015 event was in excess of the 98th percentile

FIGURE 3-4
NILAND SEASONAL
FRM AND FEM PM_{10} 24 HR AVG CONCENTRATIONS
***OCTOBER 1, 2010 THROUGH OCTOBER 1, 2015**



***October 1, 2010 through December 31, 2014 and October 1, 2015**

Fig 3-4: The 24-hr average PM_{10} concentration at the Niland monitoring site demonstrates that the October 1, 2015 event was in excess of the 98th percentile

For the combined FRM and FEM data sets for the Niland monitor the annual historical and the seasonal historical PM_{10} concentration of 171 µg/m^3 both are above the 98th percentile rank. Looking at the annual time series concentrations, the seasonal time series concentrations and the percentile rankings for both the historical and seasonal patterns the October 1, 2015 measured exceedance is clearly outside the normal concentration levels when comparing to non-event days and event days.

III.2 Summary

The information provided, above, by the time series plots, seasonal time series plots, and the percentile rankings illustrate that the PM_{10} concentration observed on October 1, 2015 occurs infrequently. When comparing the measured PM_{10} levels on October 1, 2015 and following USEPA EER guidance, this demonstration provides supporting evidence that the measured exceedance days measured at the Brawley monitoring site was outside the normal historical and seasonal historical concentration levels.

The historical concentration analysis provided here supports the determination that the October 1, 2015 natural event affected the concentrations levels at the Niland monitor causing an exceedance. The concentration analysis further supports that the natural event affected air quality in such a way that there exists a clear causal relationship between the measured exceedances on October 1, 2015 and the natural event, qualifying the natural event as an Exceptional Event.

IV Not Reasonably Controllable or Preventable

According to the October 3, 2016 promulgated revision to the Exceptional Event (EE) rule under 40 CFR §50.14(b)(8) air agencies must address the "not reasonably controllable or preventable" (nRCP) criterion as two prongs. In order to properly address the nRCP criterion the ICAPCD must not only identify the natural and anthropogenic sources of emissions causing and contributing to the monitored exceedance but must identify the relevant State Implementation Plan (SIP) measures and/or other enforceable control measures in place for the identified sources. An effective analysis of the nRCP must include the implementation status of the control measures in order to properly consider the measures as enforceable. USEPA considers control measures enforceable if approved into the SIP within 5 years of an EE demonstration submittal. The identified control measures must address those specific sources that are identified as causing or contributing to a monitored exceedance.

The final EE rule revision explains that an event is considered not reasonably controllable if reasonable measures to control the impact of the event on air quality were applied at the time of the event. Similarly, an event is considered not reasonably preventable if reasonable measures to prevent the event were applied at the time of the event. However, for "high wind events" when PM_{10} concentrations are due to dust raised by high winds from desert areas whose sources are controlled with Best Available Control Measures (BACM) then the event is a "natural event" where human activity plays little or no direct causal role and thus is considered not preventable

This section begins by providing background information on all SIP and other enforceable control measures in force during the EE for October 1, 2015. In addition, this October 1, 2015 demonstration provides technical and non-technical evidence that strong gusty westerly winds blew across the mountains and deserts within southeastern California and into Imperial County suspending particulate matter affecting the Niland monitor on October 1, 2015. This section identifies all natural and anthropogenic sources and provides regulatory evidence of the enforceability of the control measures in place during the October 1, 2015 EE.

IV.1 Background

Inhalable particulate matter (PM_{10}) contributes to effects that are harmful to human health and the environment, including premature mortality, aggravation of respiratory and cardiovascular disease, decreased lung function, visibility impairment, and damage to vegetation and ecosystems. Upon enactment of the 1990 Clean Air Act (CAA) amendments, Imperial County was classified as moderate nonattainment for the PM_{10} NAAQS under CAA sections 107(d)(4)(B) and 188(a). By November 15, 1991, such areas were required to develop and submit State Implementation Plan (SIP) revisions providing for, among other things, implementation of reasonably available control measures (RACM).

Partly to address the RACM requirement, ICAPCD adopted local Regulation VIII rules to control PM_{10} from sources of fugitive dust on October 10, 1994, and revised them on November 25,

1996. USEPA did not act on these versions of the rules with respect to the federally enforceable SIP.

On August 11, 2004, USEPA reclassified Imperial County as a serious nonattainment area for PM_{10}. As a result, CAA section 189(b)(1)(B) required all BACM to be implemented in the area within four years of the effective date of the reclassification, i.e., by September 10, 2008.

On November 8, 2005, partly to address the BACM requirement, ICAPCD revised the Regulation VIII rules to strengthen fugitive dust requirements. On July 8, 2010, USEPA finalized a limited approval of the 2005 version of Regulation VIII, finding that the seven Regulation VIII rules largely fulfilled the relevant CAA requirements. Simultaneously, USEPA also finalized a limited disapproval of several of the rules, identifying specific deficiencies that needed to be addressed to fully demonstrate compliance with CAA requirements regarding BACM and enforceability.

In September 2010, ICAPCD and the California Department of Parks and Recreation (DPR) filed petitions with the Ninth Circuit Federal Court of Appeals for review of USEPA's limited disapproval of the rules. After hearing oral argument on February 15, 2012, the Ninth Circuit directed the parties to consider mediation before rendering a decision on the litigation. On July 27, 2012, ICAPCD, DPR and USEPA reached agreement on a resolution to the dispute, which included a set of specific revisions to Regulation VIII. These revisions are reflected in the version of Regulation VIII adopted by ICAPCD on October 16, 2012 and approved by USEPA April 22, 2013. Since 2006, ICAPCD had implemented regulatory measures to control emissions from fugitive dust sources and open burning in Imperial County.

FIGURE 4-1
REGULATION VIII GRAPHIC TIMELINE DEVELOPMENT

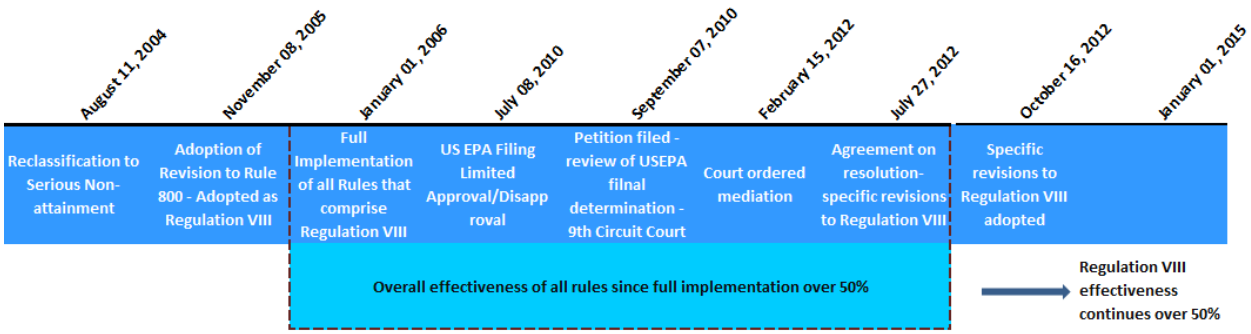


Fig 4-1: Regulation VIII Graphic Timeline

IV.1.a Control Measures

Below is a brief summary of Regulation VIII, which is comprised of seven fugitive dust rules. **Appendix D** contains a complete set of the Regulation VIII rules.

ICAPCD's Regulation VIII consists of seven interrelated rules designed to limit emissions of PM_{10}

from anthropogenic fugitive dust sources in Imperial County.

Rule 800, General Requirements for Control of Fine Particulate Matter, provides definitions, a compliance schedule, exemptions and other requirements generally applicable to all seven rules. It requires the United States Bureau of Land Management (BLM), United States Border Patrol (BP) and DPR to submit dust control plans (DCP) to mitigate fugitive dust from areas and/or activities under their control. Appendices A and B within Rule 800 describe methods for determining compliance with opacity and surface stabilization requirements in Rules 801 through 806.

Rule 801, Construction and Earthmoving Activities, establishes a 20% opacity limit and control requirements for construction and earthmoving activities. Affected sources must submit a DCP and comply with other portions of Regulation VIII regarding bulk materials, carry-out and track-out, and paved and unpaved roads. The rule exempts single family homes and waives the 20% opacity limit in winds over 25 mph under certain conditions.

Rule 802, Bulk Materials, establishes a 20% opacity limit and other requirements to control dust from bulk material handling, storage, transport and hauling.

Rule 803, Carry-Out and Track-Out, establishes requirements to prevent and clean-up mud and dirt transported onto paved roads from unpaved roads and areas.

Rule 804, Open Areas, establishes a 20% opacity limit and requires land owners to prevent vehicular trespass and stabilize disturbed soil on open areas larger than 0.5 acres in urban areas, and larger than three acres in rural areas. Agricultural operations are exempted.

Rule 805, Paved and Unpaved Roads, establishes a 20% opacity limit and control requirements for unpaved haul and access roads, canal roads and traffic areas that meet certain size or traffic thresholds. It also prohibits construction of new unpaved roads in certain circumstances. Single-family residences and agricultural operations are exempted.

Rule 806, Conservation Management Practices, requires agricultural operation sites greater than 40 acres to implement at least one conservation management practice (CMP) for each of several activities that often generates dust at agricultural operations. In addition, agricultural operation sites must prepare a CMP plan describing how they comply with Rule 806, and must make the CMP plan available to the ICAPCD upon request.

IV.1.b Additional Measures

Imperial County Natural Events Action Plan (NEAP)

On August 2005, the ICAPCD adopted a NEAP for the Imperial County, as was required under the former USEPA Natural Events Policy, to address PM_{10} events by:

- Protecting public health;
- Educating the public about high wind events;
- Mitigating health impacts on the community during future events; and
- Identifying and implementing BACM measures for anthropogenic sources of windblown dust.

Smoke Management Plan (SMP) Summary

There are 35 Air Pollution Control Districts or Air Quality Management Districts in California which are required to implement a district-wide smoke management program. The regulatory basis for California's Smoke Management Program, codified under Title 17 of the California Code of Regulations is the "Smoke Management Guidelines for Agricultural and Prescribed Burning" (Guidelines). California's 1987 Guidelines revised to improve interagency coordination, avoid smoke episodes, and provide continued public safety while providing adequate opportunity for necessary open burning. The revisions to the 1987 Guidelines approved March 14, 2001. All air districts, with the exception of the San Joaquin Valley Air Pollution Control District (SJAPCD) were required to update their existing rules and Smoke Management Plans to conform to the most recent update to the Guidelines.

Section 80150 of Title 17 specifies the special requirements for open burning in agricultural operations, the growing of crops and the raising of fowl or animals. This section specifically requires the ICAPCD to have rules and regulations that require permits that contain requirements that minimize smoke impacts from agricultural burning.

On a daily basis, the ICAPCD reviews surface meteorological reports from various airport agencies, the NWS, State fire agencies and CARB to help determine whether the day is a burn day. Using a four-quadrant map of Imperial County allowed burns are allocated in such a manner as to assure minimal to no smoke impacts safeguarding the public health. Finally, all permit holders are required to notice and advise members of the public of a potential burn. This noticing requirement is the Good Neighbor Policy. On October 1, 2015, the ICAPCD declared a No Burn day **(Appendix A).** No complaints were filed for agricultural burning on October 1, 2015

IV.1.c Review of Source Permitted Inspections and Public Complaints

A query of the ICAPCD permit database was compiled and reviewed for active permitted sources throughout Imperial County and specifically around Niland during the October 1, 2015 PM_{10} exceedance. Both permitted and non-permitted sources are required to comply with Regulation VIII requirements that address fugitive dust emissions. The identified permitted sources are Aggregate Products, Inc., US Gypsum Quarry, Imperial Aggregates (Val-Rock, Inc., and Granite Construction), US Gypsum Plaster City, Clean Harbors (Laidlaw Environmental Services), Bullfrog Farms (Dairy), Burrtec Waste Industries, Border Patrol Inspection station, Centinela State Prison, various communications towers not listed and various agricultural operations. Non-permitted sources include the wind farm known as Ocotillo Express, and a solar facility known as CSolar IV

West. Finally, the desert regions are under the jurisdiction of the Bureau of Land Management and the California Department of Parks (Including Anza Borrego State Park and Ocotillo Wells).

An evaluation of all inspection reports, air quality complaints, compliance reports, and other documentation indicate no evidence of unusual anthropogenic-based PM_{10} emissions. There were no complaints filed on October 1, 2015, officially declared as No Burn days, related to agricultural burning, waste burning or dust.

FIGURE 4-2
PERMITTED SOURCES

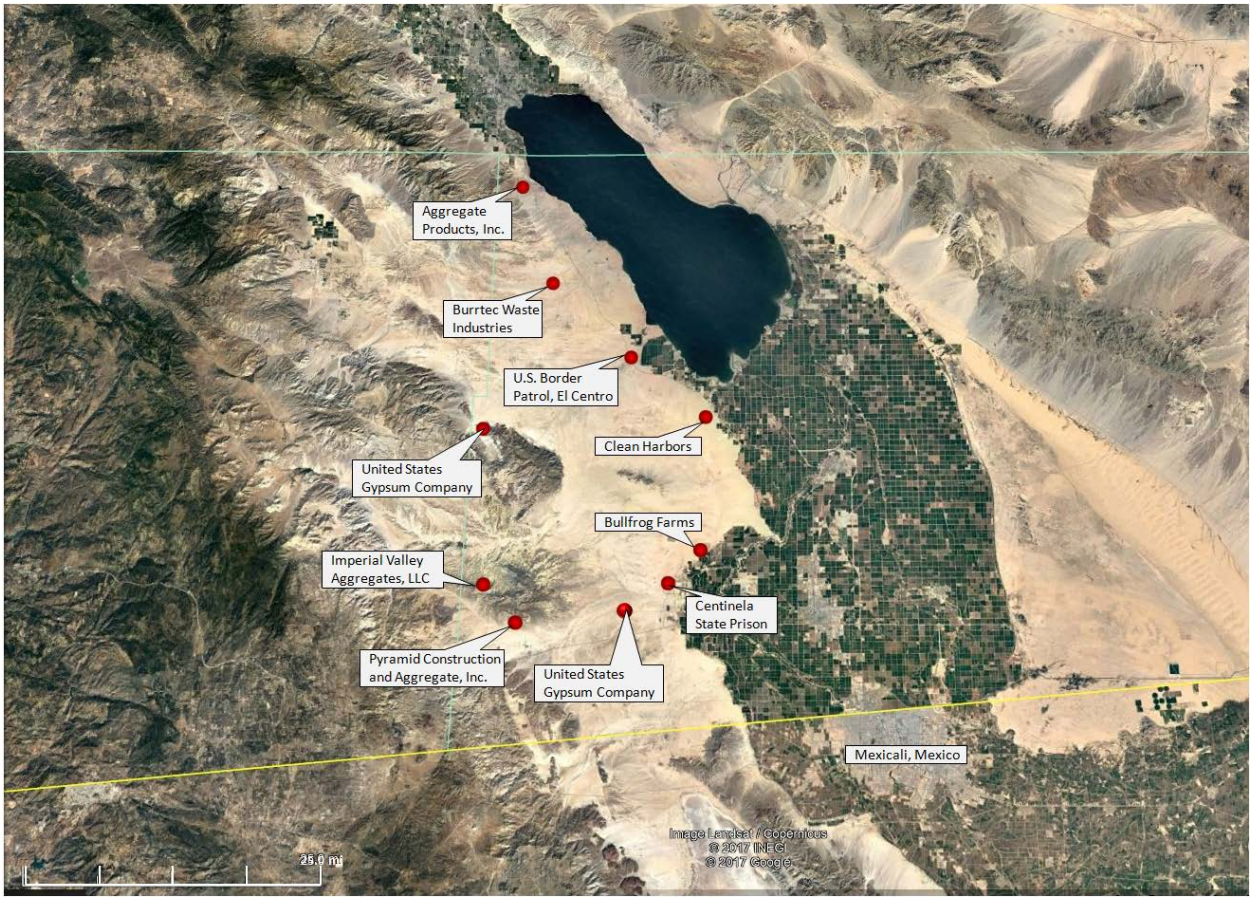


Fig 4-2: The above map identifies those permitted sources located west, northwest and southwest of the Niland monitor. The green line to the north denotes the political division between Imperial and Riverside counties. The yellow line below denotes the international border between the United States and Mexico. The green checker-boarded areas are a mixed use of agricultural and community parcels. In addition, either the Bureau of Land Management or the California Department of Parks manages the desert areas. Base map from Google Earth

FIGURE 4-3
NON-PERMITTED SOURCES

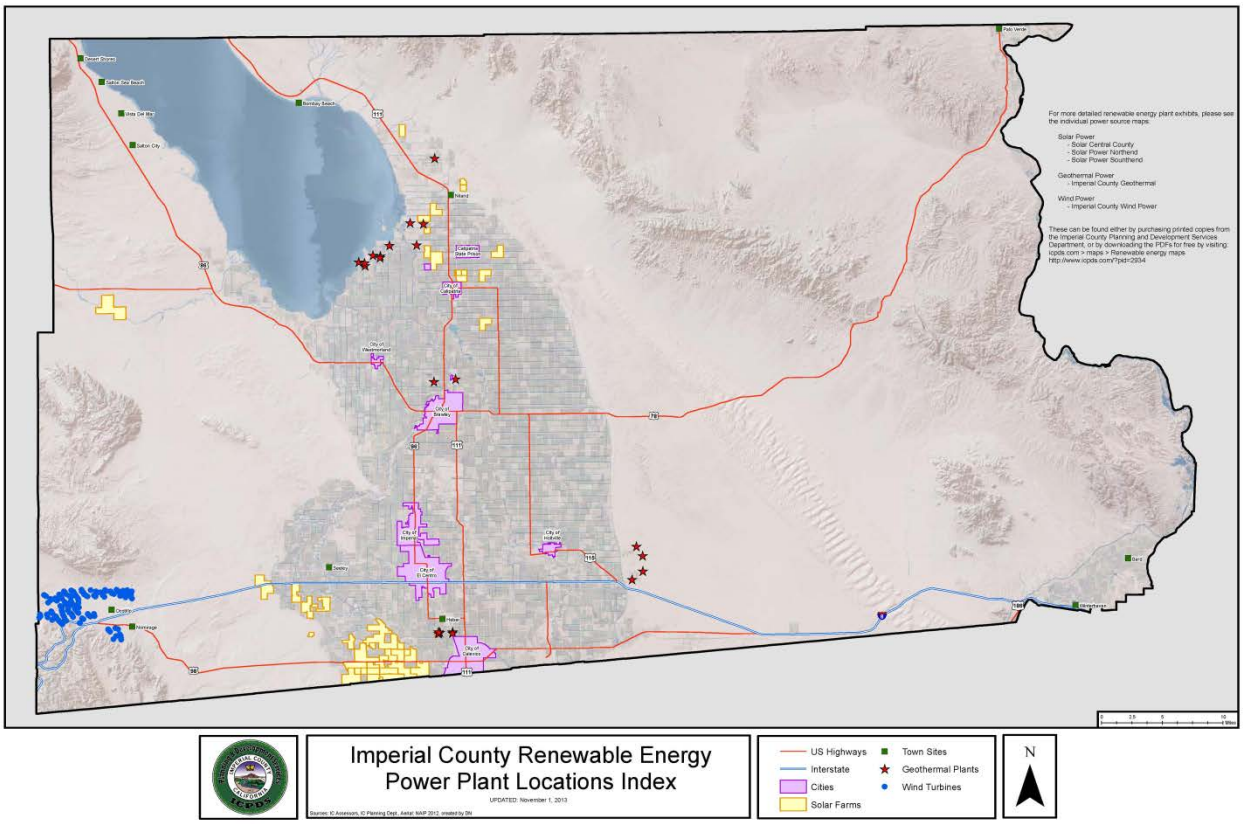


Fig 4-3: The above map identifies those power sources located west, northwest and southwest of the Niland monitor. Blue indicate the Wind Turbines, Yellow are the solar farms and stars are geothermal plants

IV.2 Forecasts and Warnings

As mentioned above, the San Diego NWs office discussed two low-pressure troughs that would affect California as early as September 29, 2015. The first low pressure trough, located off the Northern California coast spun southwest flow across Southern California eventually moving east through Northern California and Nevada on Thursday, October 1, 2015. The second low, described as taking aim at California by Sunday, October 4, 2015 started out in British Columbia and moved southward exactly following the west coast. The NWS office in Phoenix discussed the two systems Wednesday, September 30, 2015, as lowering heights out west and tightening gradients across Southern California and Western Arizona. By October 1, 2015, the Phoenix NWS office described a cooling in response to an approaching low-pressure system centered off the Northern California coast during the early morning hours. The Phoenix office explained that as the system moves eastward, across the western states not only would it displace the ridge but also bring elevated wind speeds for the afternoon and evening hours, especially over Southeast California.

On October 1, 2015 a couple of low-pressure systems affected the Western states, the first system moved through the area Thursday, October 1, 2015 and brought gusty westerly winds through the San Diego Mountains and deserts. The San Diego NWS office evening Areas Forecast disclosed reported wind gust of 25 to 30 mph within several locations in the mountains as early as 710pm PST. **Appendix A** contains copies of notices pertinent to the October 1, 2015 event.

IV.3 Wind Observations

Wind data during the event were available from airports in eastern Riverside County, southeastern San Diego County, southwestern Yuma County (Arizona), northern Mexico, and Imperial County. Both local airports began measuring elevated winds, with the El Centro Naval Air Facility (NAF) (KNJK) consistently higher than the Imperial County Airport, at 1253 and 1256 PST, respectively. While measured wind speeds at KIPL remained moderate to strong KNJK measured strong to moderate wind speeds with one hour at the 25mph threshold. Both airports measured westerly winds with KIPL measuring variable west winds between WSW to WNW and W and KNJK measured six hours of SW winds, coincident with the strongest wind speeds and six hours of W winds coincident with the strong to moderate level winds. Other sites such as Fish Creek Mountains (MesoWest Station ID: FHCC1) and the Salton City monitor measured elevated gusts and wind speeds above the 25-mph threshold. During the October 1, 2015 event wind speeds were above the 25-mph threshold overcoming the BACM in place.

IV.4 Summary

The weather and air quality forecasts and warnings outlined in this section demonstrate that high winds accompanying the passing of a low-pressure trough through California entrained particulate matter that caused uncontrollable PM_{10} emissions. The BACM list as part of the control measures in Imperial County for fugitive dust emissions were in place at the time of the event. These control measures are required for areas designated as "serious" non-attainment for PM_{10}, such as Imperial County. Thus, the BACM in place at the time of the event were beyond reasonable. In addition, surface wind measurements west of the Niland monitoring station during the event were high enough (at or above 25 mph, with wind gusts of 30 mph) that BACM PM_{10} control measures would have been overwhelmed.

Finally, a high wind dust event can be considered as a natural event, even when portions of the wind-driven emissions are anthropogenic, as long as those emissions have a clear causal relationship to the event and were determined to be not reasonably controllable or preventable. This demonstration has shown that the event that occurred on October 1, 2015 was not reasonably controllable or preventable despite the strong and in force BACM within the affected areas in Imperial County. This demonstration has similarly established a clear causal relationship between the exceedances and the high wind event timeline and geographic location. The October 1, 2015 event can be considered an exceptional event under the requirements of the exceptional event rule.

V Clear Causal Relationship

V.1 Discussion

Meteorological observations for October 1, 2015, identified the first of two low-pressure systems moving through California that enhanced the onshore flow producing locally strong westerly winds that blew through the San Diego Mountains and deserts and into Imperial County.

As mentioned in section II, the San Diego and Phoenix NWS offices discussed two low-pressure troughs that would affect California on Thursday, October 1, 2015 and Sunday, October 4, 2015. The first low pressure trough eventually moved east through Northern California and Nevada on Thursday, October 1, 2015 while the second low was expected by Sunday, October 4, 2015. On October 1, 2015, as the first system moved eastward, across the western states elevated wind speeds for the afternoon and evening hours, especially over Southeast California occurred. The San Diego NWS office issued an evening Area Forecast disclosing reported wind gust of 25 to 30 mph within several locations in the mountains as early as 710pm PST.[11] Other sites such as Fish Creek Mountains (MesoWest Station ID: FHCC1) and the Salton City monitor measured elevated gusts and wind speeds above the 25 mph threshold.

Locally, both airports began measuring elevated winds, with the El Centro Naval Air Facility (NAF) (KNJK) consistently higher than the Imperial County Airport, at 1253 and 1256 PST, respectively. While measured wind speeds at KIPL remained moderate to strong KNJK measured strong to moderate wind speeds. Both airports measured westerly winds with KIPL measuring variable west winds between WSW to WNW and W and KNJK measured six hours of SW winds, coincident with the strongest wind speeds and six hours of W winds coincident with the strong to moderate level winds.

The variability of the winds, not the strength of the winds created conditions conducive to intermittent elevated levels of PM_{10} concentrations at all the air monitors. Both the Brawley and Niland monitors measured 8 hours of elevated PM_{10} concentrations while the Westmorland and El Centro monitors measured less than 8 hours coincident with the strong to moderate wind speeds on October 1, 2015.

Entrained windblown dust from natural areas, particularly from the desert area and anthropogenic sources controlled with BACM, is verified by the meteorological and air quality observations on October 1, 2015. Meteorological data show that these strong and gusty westerly winds blew across the San Diego mountain slopes and natural open deserts were directly responsible for the high PM_{10} concentrations observed in Imperial County on October 1, 2015.

Figures 5-1 through 5-4 provide information regarding the timing of the tightening of the pressure gradient and the amount of aerosols existing in the ambient air on October 1, 2015.

[11] San Diego NWS office Area Forecast, 810pm PST (910pm PDT) Thursday, October 1, 2015.

FIGURE 5-1
SURFACE GRADIENT TIGHTENS ACROSS SE CALIFORNIA

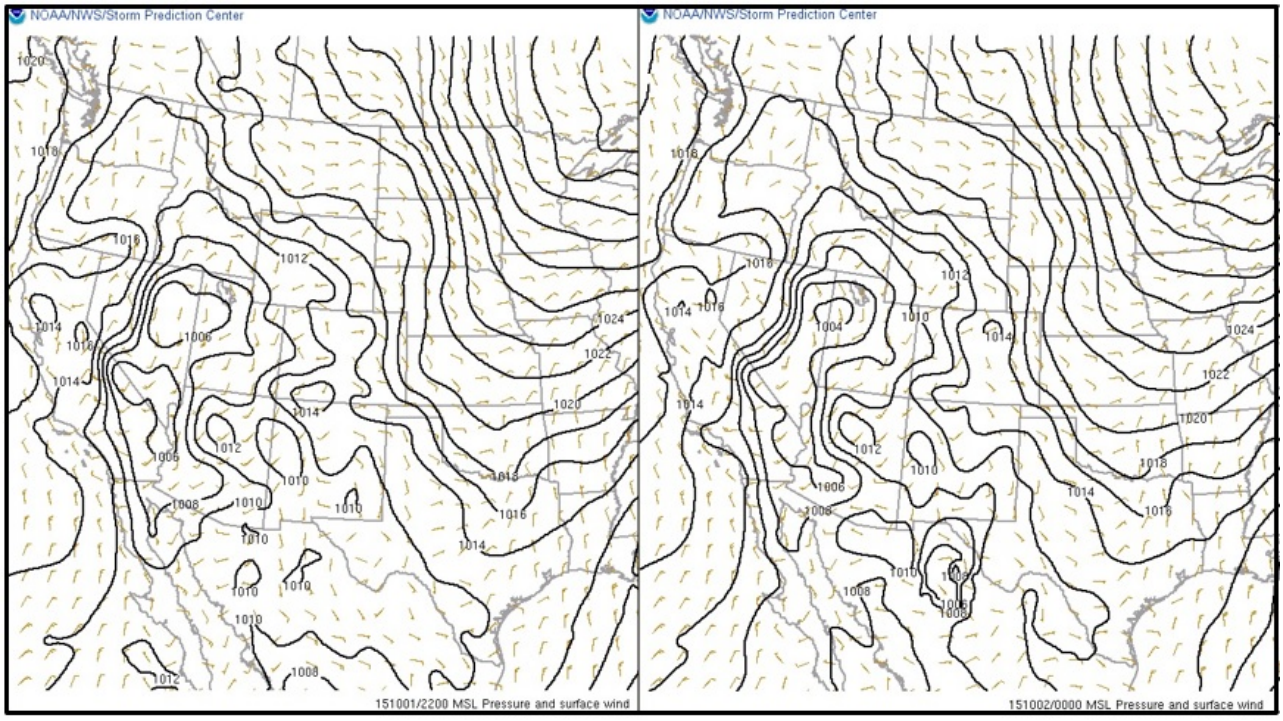


Fig 5-1: The tightening of the surface gradient across southeast California as the onshore flow deepened caused gusty west winds across the region. At 1400 PST (left) as the gradient packs' winds elevate. By 1600 PST (right) gusty westerly winds are measured at several sites. Source: Storm Prediction center; http://www.spc.noaa.gov

FIGURE 5-2
SURFACE GRADIENT TIGHTENS ACROSS SE CALIFORNIA 1800 THROUGH 2000

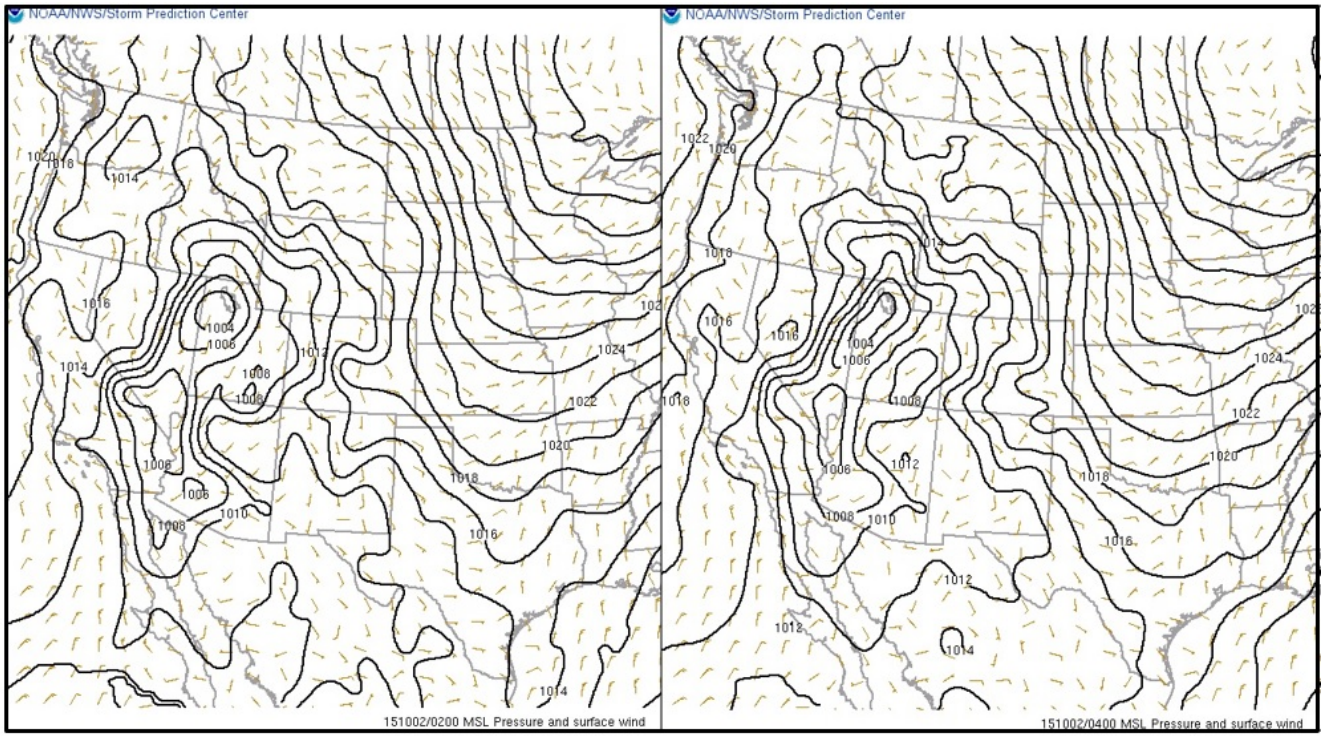


Fig 5-2: The image illustrates the packed gradient coincident with the peak hourly measured concentration at the Niland monitor at 1800 (left). By 2000 (right) the gradient has relaxed. Winds declined shortly afterwards. Source: Storm Prediction center; http://www.spc.noaa.gov

Figures 5-3 and 5-4 are satellite images that show the Deep Blue Aerosol Angstrom Exponent[12] Layer illustrating thickness. The Deep Blue Angstrom Exponent layer helps to discern larger sized aerosol particles that are likely dust. Although the images taken are not during the measured peak concentrations, the Terra and Aqua satellite images do capture particulates in the ambient air.[13]

[12]The MODIS **Deep Blue Aerosol Ångström Exponent** layer can be used to provide additional information related to the aerosol particle size over land. This layer is created from the Deep Blue (DB) algorithm, originally developed for retrieving over desert/arid land (bright in the visible wavelengths). The Ångström exponent provides additional information on the particle size (larger the exponent, the smaller the particle size). Values < 1 suggest optical dominance of coarse particles (e.g. dust) and values > 1 suggest optical dominance of fine particles (e.g. smoke).

[13] **MODIS** (or Moderate Resolution Imaging Spectroradiometer) is a key instrument aboard the Terra (originally known as EOS AM-1) and Aqua (originally known as EOS PM-1) satellites. Terra's orbit around the Earth is timed so that it passes from north to south across the equator in the morning, while Aqua passes south to north over the equator in the afternoon. MODIS Technical Specifications identify the Terra orbit at 10:30am and the Aqua at 1:30pm.

FIGURE 5-3
DUST LIKE AEROSOLS OVER SOUTHEAST CALIFORNIA BEGIN TO BUILD

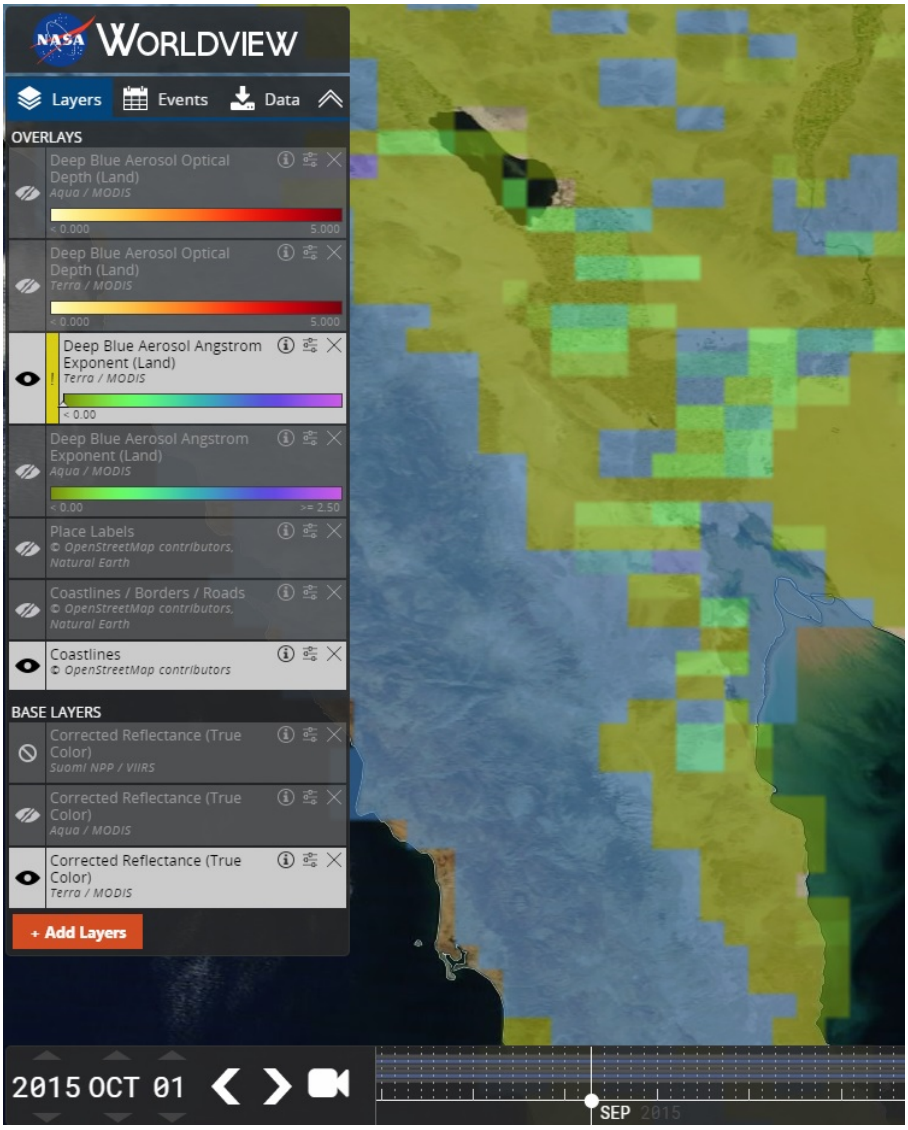


Fig 5-3: When the Terra satellite made its pass (~1030 PST) there was already a substantial layer of dust-sized aerosols over southeast California. Greener colors indicate particles that are more likely dust. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

FIGURE 5-4
DUST LIKE AEROSOLS REMAIN OVER SOUTHEAST CALIFORNIA

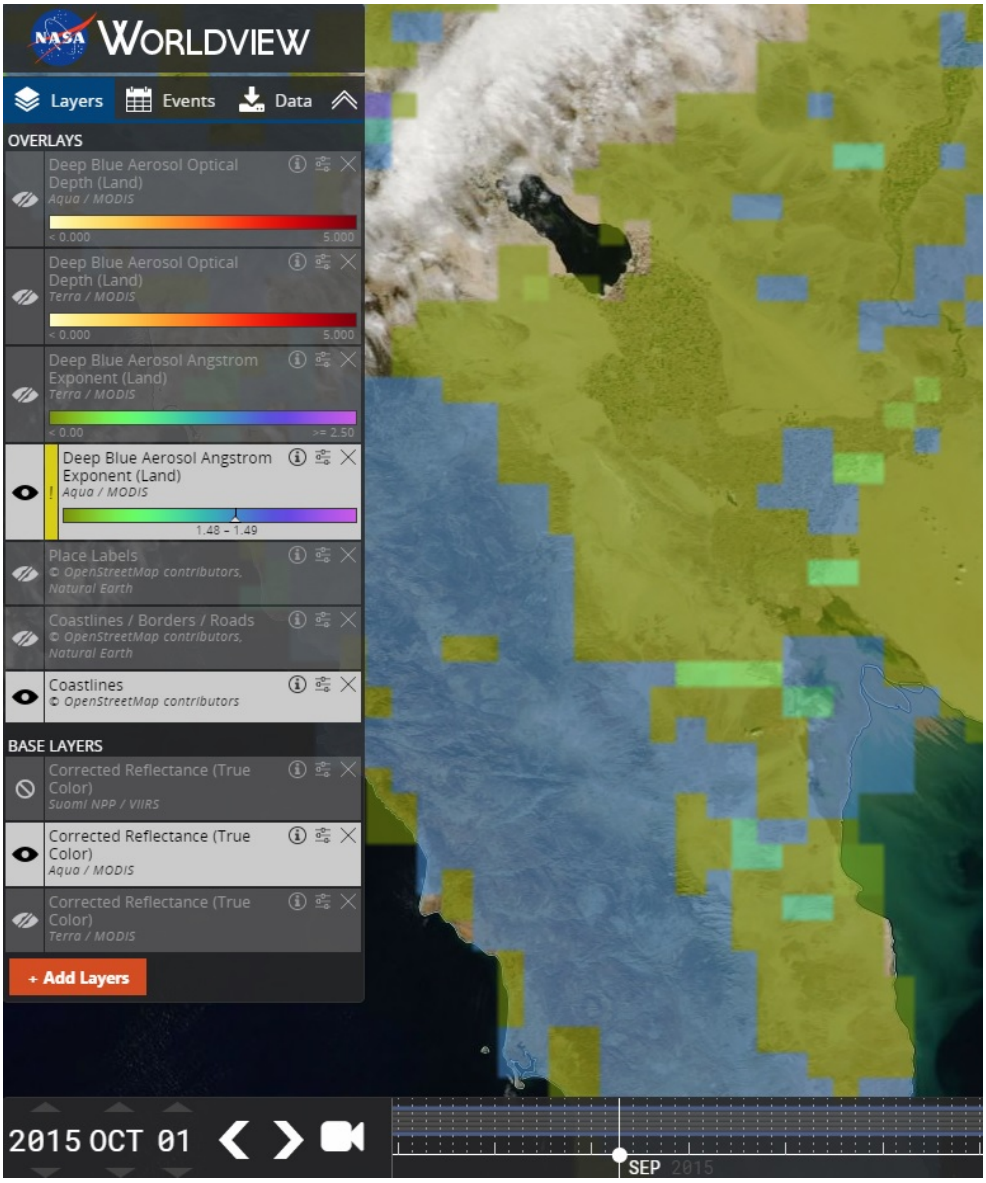


Fig 5-4: When the Aqua satellite made its pass (~1330 PST) more dust-sized aerosols were over southeast California. Greener colors indicate particles that are more likely dust. Source: NASA Worldview; https://worldview.earthdata.nasa.gov

The EPA accepts a high wind threshold for sustained winds of 25 mph in California and 12 other states.[14] **Tables 5-1 through 5-2** provide a temporal relationship of wind speeds, wind direction, wind gusts (if available), and PM_{10} concentrations at the exceeding station. The Niland monitor shows peak hourly concentrations following or during the period of high upstream wind speeds. Strong west winds blew across and through the mountain passes of San Diego County, down the

[14] "Treatment of Data Influenced by Exceptional Events; Final Guidance", FR Vol. 81, No. 191, 68279, October 3, 2016

canyon/desert slopes and across the desert floor of Imperial County. The strong west winds entrained windblown dust toward Niland, elevating concentrations sufficiently to cause an exceedance.

TABLE 5-1
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR NILAND OCTOBER 1, 2015

El Centro NAF (KNJK)				Imperial County Airport (kipl)				Fish Creek Mountains (FHCC1)				Niland			Niland	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/D	HOUR	PM_{10} (µg/m³)
56	5		70	53	0		0	0:26	9	13	198	0:00	8	125	0:00	19
156	5		160	153	9		130	1:26	7	15	201	1:00	5	137	1:00	17
256	5		160	253	7		150	2:26	3	10	174	2:00	4	194	2:00	49
356	0		0	353	3		180	3:26	5	10	193	3:00	5	104	3:00	53
456	5		180	453	6		150	4:26	7	10	198	4:00	5	113	4:00	21
556	0		0	553	0		0	5:26	3	11	242	5:00	2	103	5:00	31
656	0		0	653	0		0	6:26	7	9	213	6:00	3	124	6:00	123
756	0		0	753	0		0	7:26	3	12	204	7:00	3	131	7:00	453
856	3		30	853	3		VR	8:26	1	5	14	8:00	7	159	8:00	266
956	3		30	953	0		0	9:26	2	9	95	9:00	4	194	9:00	
1056	6		40	1053	0		0	10:26	9	20	266	10:00	4	228	10:00	51
1156	6		340	1153	0		0	11:26	11	22	319	11:00	4	231	11:00	27
1256	15	22	230	1253	10		260	12:26	9	29	291	12:00	6	220	12:00	8
1356	20		240	1353	11		230	13:26	10	22	287	13:00	5	247	13:00	42
1456	24		230	1453	20	30	250	14:26	15	30	291	14:00	12	276	14:00	45
1556	23	30	240	1553	21		250	15:26	11	27	279	15:00	17	266	15:00	72
1656	18		250	1653	15		250	16:26	11	28	268	16:00	19	269	16:00	49
1756	25		250	1753	17		260	17:26	16	28	265	17:00	21	265	17:00	451
1856	22		260	1853	17		260	18:26	12	31	245	18:00	25	262	18:00	903
1956	17		270	1953	17		290	19:26	13	27	247	19:00	24	266	19:00	659
2056	17		280	2053	17	24	290	20:26	10	27	339	20:00	24	274	20:00	332
2156	20		270	2153	15		290	21:26	17	30	259	21:00	22	269	21:00	132
2256	18		280	2253	15		280	22:26	13	33	275	22:00	17	271	22:00	91
2356	16		270	2353	11		290	23:26	12	30	250	23:00	15	277	23:00	49

Wind data for KIPL and KNJK from the NCEI's QCLCD system. Wind data for Fish Creek Mountains from the University of Utah's MesoWest system. Wind speeds = mph; Direction = degrees. Niland does not record wind gusts

TABLE 5-2
WIND SPEEDS AND PM_{10} CONCENTRATIONS FOR NILAND OCTOBER 1, 2015

Borrego Springs (DW1021)				Ocotillo Wells (AS938/KD6RSQ5)				Salton City				Naval Test Base				Niland	
HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	W/S	W/G	W/D	HOUR	PM_{10} (µg/m³)
0:07	1	3	5	0:58	9	13	326	0:00	5.3		286	0:00	9		327	0:00	19
1:07	2	4	0	1:58	7	12	348	1:00	6		300	1:00	9		320	1:00	17
2:07	10	16	216	2:58	6	10	330	2:00	3.8		286	2:00	8		323	2:00	49
3:07	4	16	268	3:58	8	11	331	3:00	4		306	3:00	6		315	3:00	53
4:07	11	17	225	4:58	7	11	326	4:00	7.4		279	4:00				4:00	21
5:38				5:58	8	13	315	5:00	6.8		270	5:00	4		271	5:00	31
6:38				6:58	13	20	307	6:00	5.6		307	6:00	4		245	6:00	123
7:38				7:58	13	22	300	7:00	4.9		297	7:00	4		267	7:00	453
8:38				8:58	9	16	315	8:00	7.4		330	8:00	3		170	8:00	266
9:38	7	14	290	9:58	11	21	302	9:00	4.6		335	9:00	4		67	9:00	
10:09	14	23	288	10:58	16	25	341	10:00	3.6		89	10:00				10:00	51
11:10	25	30	231	11:58	12	20	299	11:00	6.2		112	11:00				11:00	27
12:40	21	28	237	12:58	16	25	307	12:00	4.2		145	12:00	9		75	12:00	8
13:10	25	30	246	13:58	17	27	324	13:00				13:00	17		278	13:00	42
14:40	21	28	242	14:58	12	22	315	14:00	26		249	14:00	21		275	14:00	45
15:40	22	29	227	15:58	17	32	296	15:00	22		246	15:00	17		271	15:00	72
16:25	24	31	247	16:58	18	33	306	16:00	25		245	16:00	18		275	16:00	49
17:10	22	34	226	17:58	16	24	315	17:00	28		250	17:00	20		272	17:00	451
18:11	21	28	228	18:58	12	27	315	18:00	30		255	18:00	23		271	18:00	903
19:11	13	21	243	19:58	17	32	313	19:00	29		258	19:00	25		276	19:00	659
20:11				20:58	16	25	306	20:00	27		265	20:00	25		268	20:00	332
21:11	16	21	272	21:58	9	18	309	21:00	26		255	21:00	16		270	21:00	132
22:11	10	19	262	22:58	13	23	299	22:00	22		240	22:00	22		275	22:00	91
23:11	11	18	286	23:58	14	23	323	23:00	18		242	23:00	22		259	23:00	49

Wind data for Borrego Springs and Ocotillo Wells from the University of Utah's MesoWest system. Wind data for Salton City and the former Naval Test Base from AQMIS2. Wind speeds = mph; Direction = degrees. Salton City and Naval Test Base do not record wind gusts.

As discussed above, both airports began measuring elevated winds at 1253 PST (KNJK) and 1256 PST (KIPL). While measured wind speeds at KIPL remained moderate to strong KNJK measured strong to moderate wind speeds. Both airports measured westerly winds with KIPL measuring variable west winds between WSW to WNW and W and KNJK measured six hours of SW winds, coincident with the strongest wind speeds and six hours of W winds coincident with the strong to moderate level winds.

Before the low-pressure displaced the very strong High Pressure over the desert southwest vigilance of dry unstable air remained high within the Phoenix service area. At 0348 PST (0448

MST) the NWS office in Phoenix issued a Fire Weather Planning Forecast and a Haines High Level Index of 5 or Moderate for Imperial County.[15] This is significant because of the potential for lower atmosphere unstable air and the potential for the development of erratic fires. Erratic fires only occur when the unstable and dry air amply what normally would not cause an effect to the environment. In this instance, the erratic behavior of the air parcel around Niland potentially amplified normally controlled activity affecting the monitor negatively. Although all monitors in Imperial County measured elevated concentrations as early as 1400 PST coincident with elevated wind speeds only the Niland monitor exceeded. The variability of the winds, not the strength of the winds created conditions conducive to intermittent elevated levels of PM_{10} concentrations at all the air monitors during the afternoon hours. However, at the Niland monitor light to moderate south and southeast winds, under unstable atmospheric conditions, caused intermittent elevated concentrations of PM_{10} during the morning hours of October 1, 2015. As a result, combined with the afternoon to evening elevated winds, the early morning elevated concentrations measured at the Niland monitor allowed an exceedance at the Niland monitor.

Figure 5-5 is a graphical representation of the meteorological conditions existing on October 1, 2015 as transported windblown dust entered Imperial County during the afternoon and evening hours adding to previous conditions conducive to elevated concentrations at the Niland monitor. The inset image represents the meteorological conditions existing during the morning hours of October 1, 2015 created by the very strong High Pressure and the potential for dry unstable air.

[15] **Haines Index** (also known as Lower Atmosphere Severity Index) is a weather index developed by meteorologist Donald Haines in 1988 that measures the potential for dry, unstable air to contribute to the development of large or erratic wildland fires. The index is derived from the stability (temperature difference between different levels of the atmosphere) and moisture content (dew point depression) of the lower atmosphere. These data may be acquired with a radiosonde or simulated by a numerical weather prediction model. The index is calculated over three ranges of atmospheric pressure: low elevation (950-850 millibars (mb)), mid elevation (850-700 mb), and high elevation (700-500 mb). A Haines Index of 6 means a high potential for an existing fire to become large or exhibit erratic fire behavior, 5 means medium potential, 4 means low potential, and anything less than 4 means very low potential.

FIGURE 5-5
EXCEEDANCE FACTORS

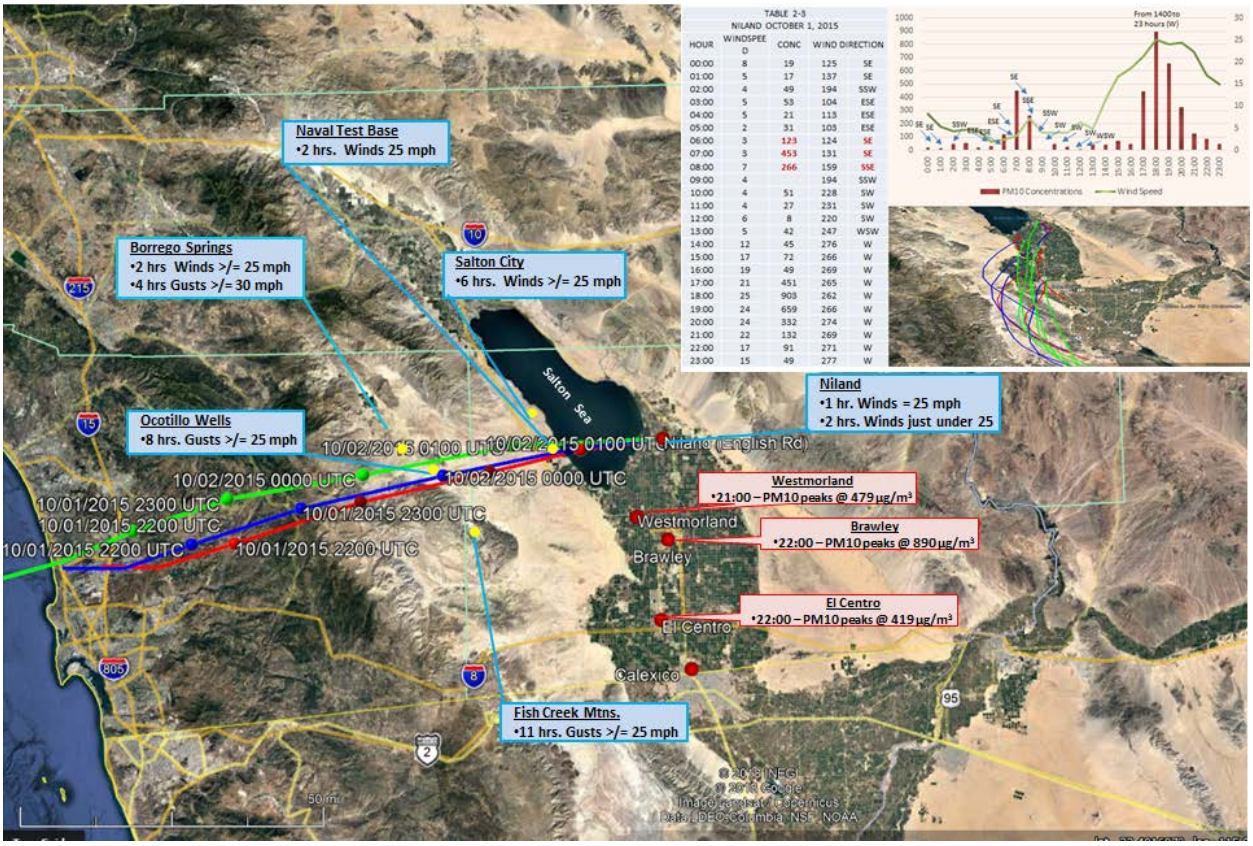


Fig 5-5: High winds and gusts at upstream wind sites played a critical role in the exceedance at Niland on October 1, 2015. Niland experienced a brief spike in the morning, then in the afternoon concentrations surged as dust-laden winds arrived. Red trajectory indicates air up 10 10m; blue 100m; green 500 m AGL (above ground level). Google Earth base map. HYSPLIT trajectory generated through NOAA's Air Resources Laboratory.

Figures 5-6 through 5-8 demonstrates the temporal relationship between the high winds and the transported windblown dust and resulting effect upon air quality in Imperial County. The positive correlation of measured PM_{10} concentrations at air monitors in Imperial County and specifically at the Niland monitor and the elevated wind speeds on October 1, 2015, indicate that as wind speeds increased so did concentrations of PM_{10}.

The elevated hourly PM_{10} concentrations occurred throughout the late afternoon and evening hours coincident with the associated elevated winds and gusts measured at the different stations in Imperial County. **Appendix C** contains additional graphs illustrating the relationship between the high PM_{10} concentrations and increased wind speeds from other monitoring sites within Imperial, Riverside, and Yuma counties on October 1, 2015**.**

FIGURE 5-6
72 HOUR PM_{10} CONCENTRATIONS AND WIND SPEED CORRELATION

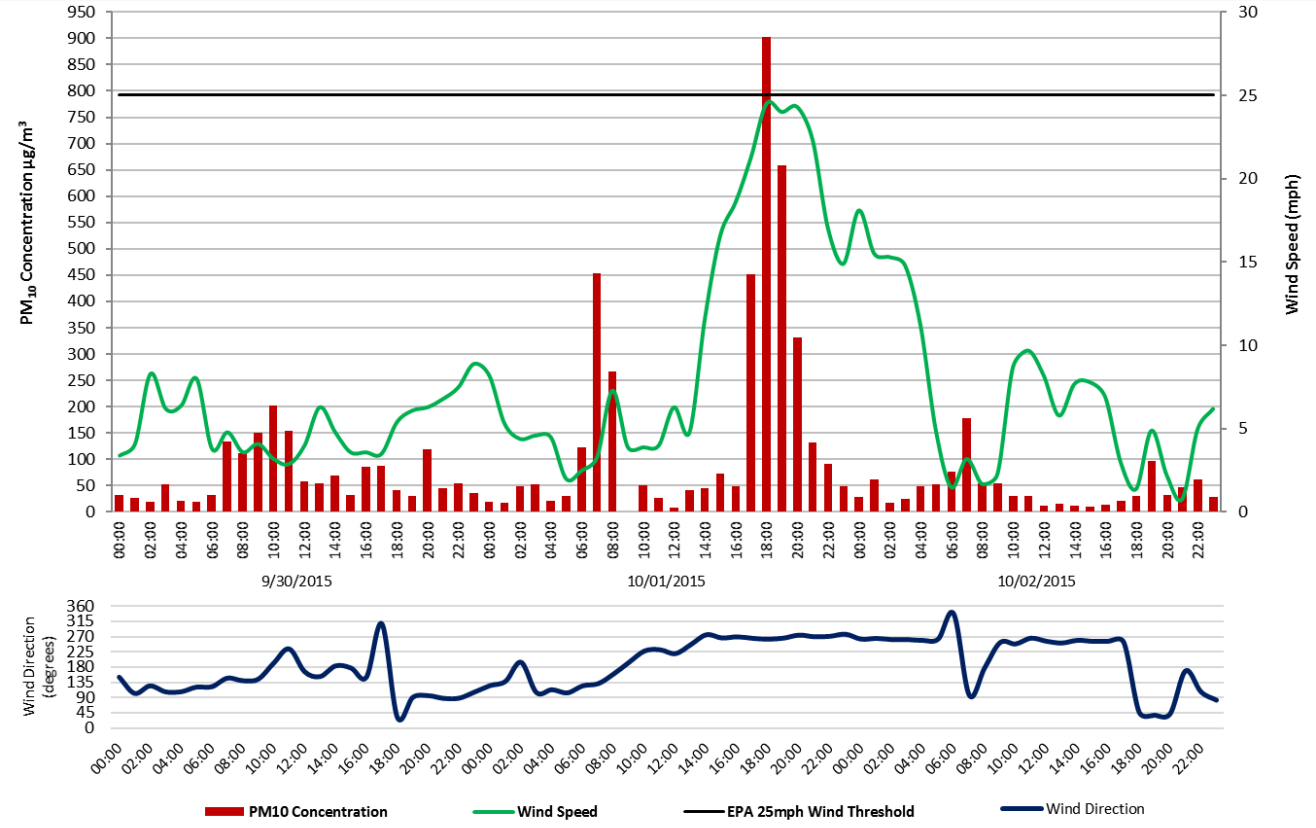


Fig 5-6: This graph illustrates the concentration levels and wind speeds for the day before, day after and October 1, 2015 for the Niland monitor

FIGURE 5-7
72 HOUR PM_{10} FLUCTUATIONS AND UPSTREAM WIND SPEEDS

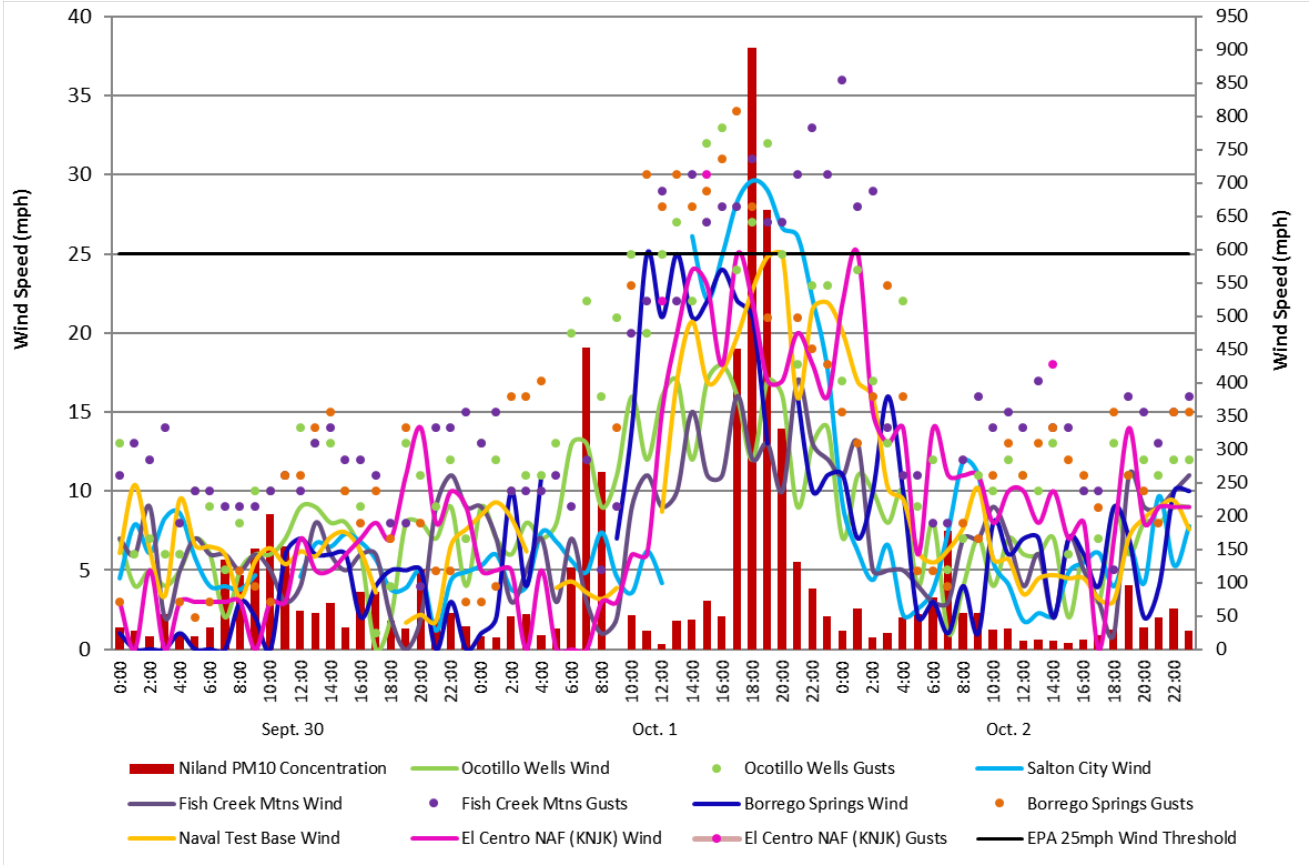


Fig 5-7: Niland PM_{10} fluctuations compared to upstream wind speeds shows a positive correlation during the event day

The NWS issued a Zone Forecast for Imperial County on Thursday, October 1, 2015, advising of high winds that could reach 20 mph with gusts of 30 mph. A forecast for the San Diego deserts immediately west of Imperial County, were expected to have winds of 20 mph and gusts of 35 mph. Forecasted evening blowing dust for the San Diego mountains and deserts (see **Appendix A**). The ICAPCD monitors air quality for each of its stations and issues web-based Air Quality Indices in response to changes in air quality. As transported windblown dust entered Imperial County, air quality for the Niland area at 7 p.m. changed from Good to Moderate, confirming an affect upon air quality in Imperial County.

FIGURE 5-8
AIR QUALITY INDEX FOR NILAND ON OCTOBER 1, 2015

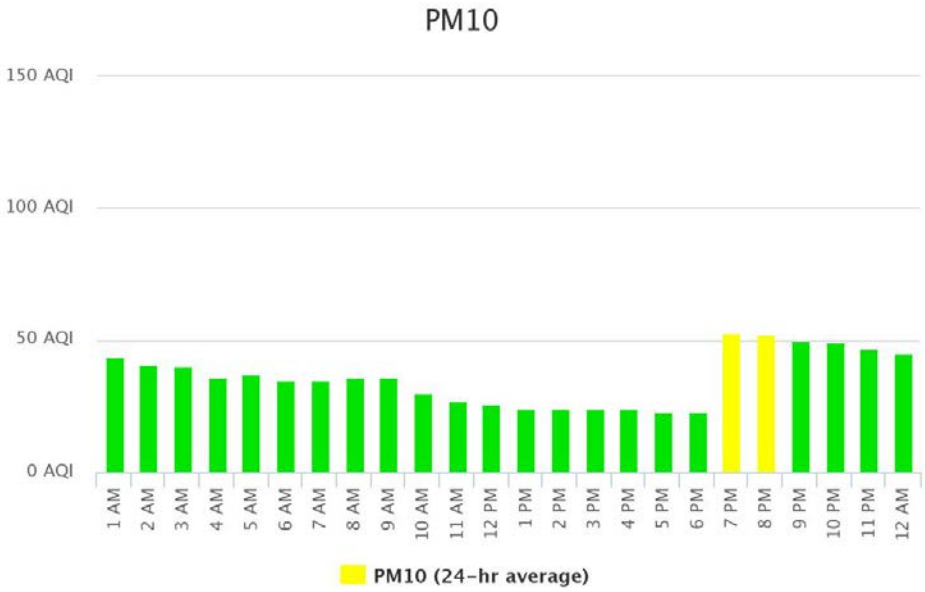


Fig 5-8: Demonstrates that air quality around Niland was affected by windblown dust generated by the strengthening of a low-pressure system.

V.2 Summary

The preceding discussion, graphs, figures, and tables provide wind direction, speed and concentration data illustrating the spatial and temporal effects of the first of two low-pressure systems moving through California that enhanced the onshore flow producing locally strong westerly winds that blew through the San Diego Mountains and deserts and into Imperial County. The information provides a clear causal relationship between the entrained windblown dust and the PM_{10} exceedance measured at the Niland monitor on October 1, 2015. Furthermore, the advisories and air quality index illustrate the affect upon air quality within the region extending from the mountains and desert slopes of San Diego County, all of Imperial County and the southern portion of Riverside County. Large amounts of coarse particles (dust) and PM_{10} transported by gusty westerly winds into the lower atmosphere caused a change in the air quality conditions within Imperial County. The entrained windblown dust originated from as far as the mountains and desert slope areas located within San Diego County and Imperial County (part of the Sonoran Desert). Combined, the information demonstrates that the elevated PM_{10} concentrations measured on October 1, 2015 coincided with high wind speeds and that gusty west winds experienced over the southern portion of Riverside County, southeastern San Diego County, all of Imperial County, and parts of Arizona.

FIGURE 5-9
OCTOBER 1, 2015 WIND EVENT TAKEAWAY POINTS

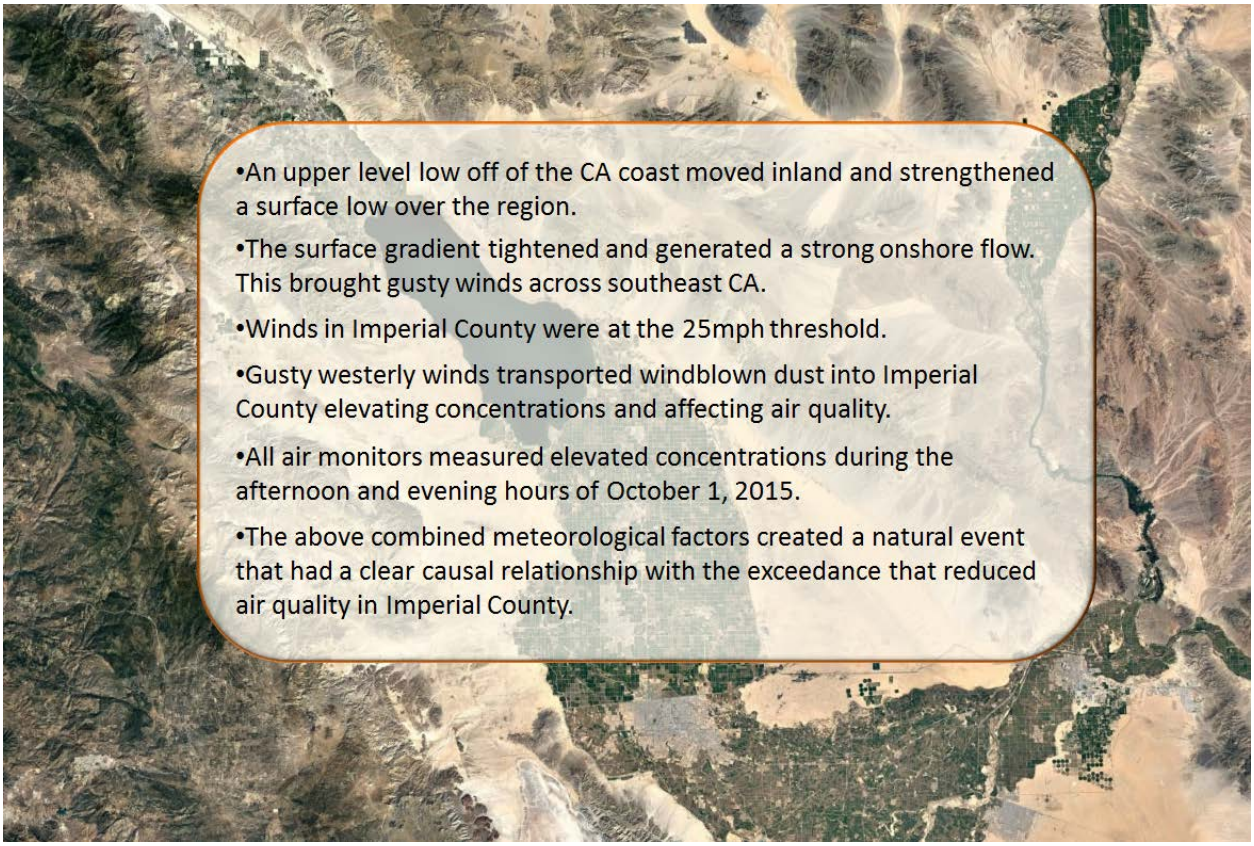


Fig 5-9: Illustrates the factors that qualify the October 1, 2015 natural event which affected air quality as an Exceptional Event

VI Conclusions

The PM_{10} exceedance that occurred on October 1, 2015, satisfies the criteria of the EER, which states that in order to justify the exclusion of air quality monitoring data evidence must be provided for the following elements:

	TABLE 6-1 TECHNICAL ELEMENTS CHECKLIST EXCEPTIONAL EVENT DEMONSTRATION FOR HIGH WIND DUST EVENT (PM_{10})	DOCUMENT SECTION
1	A narrative conceptual model that describes the event(s) causing the exceedance or violation and a discussion of how emissions from the event(s) led to the exceedance or violation at the affected monitor(s)	6-31
2	A demonstration that the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation	44-56
3	Analyses comparing the claimed event-influenced concentration(s) to concentrations at the same monitoring site at other times to support the requirement at paragraph (c)(3)(iv)(B) of this section	32-36
4	A demonstration that the event was both not reasonably controllable and not reasonably preventable	37-43
5	A demonstration that the event was a human activity that is unlikely to recur at a particular location or was a natural event	6-31 & 44-56

VI.1 Affects Air Quality

The preamble to the revised EER states that an event has affected air quality if the event affected air quality in such a way that there exists a clear causal relationship between the specific event and the monitored exceedance or violation. Given the information presented in this demonstration, particularly Section V, we can reasonably conclude that there exists a clear causal relationship between the monitored exceedance and the October 1, 2015 event, which changed or affected air quality in Imperial County.

VI.2 Not Reasonably Controllable or Preventable

Section 50.1(j) of 40 CFR Part 50 defines an exceptional event as an event that must be "not reasonably controllable or preventable" (nRCP). The revised preamble explains that the nRCP has two prongs, not reasonably preventable and not reasonably controllable. A natural wind event, which transports dust from natural open deserts, meets the nRCP, when sources are controlled by BACM and when human activity plays little to no direct causal role. This

demonstration provides evidence that despite BACM in place within Imperial County, strong gusty winds overwhelmed all BACM controls where human activity played little to no direct causal role. The PM_{10} exceedance measured at the Niland monitor caused by naturally occurring strong gusty westerly winds transported windblown dust into Imperial County and other parts of southern California from areas located within the mountains and deserts of San Diego County. These facts provide strong evidence that the PM_{10} exceedance at Niland on October 1, 2015, were not reasonably controllable or preventable.

VI.3 Natural Event

The revised preamble to the EER clarifies that a "Natural Event" (50.1(k) of 40 CFR Part 50), which may recur at the same location, is an event where human activity plays little or no direct causal role. The criteria that human activity played little or no direct causal role occurs when the event, along with its resulting emissions, are solely from natural sources or where all significant anthropogenic sources of windblown dust have been reasonably controlled. As discussed within this demonstration, windblown dust anthropogenic sources reasonably controlled with BACM in and around Niland on October 1, 2015 meet the criteria that human activity played little or no direct causal role therefore, the event qualifies as a natural event.

VI.4 Clear Causal Relationship

The time series plots of PM_{10} concentrations at Niland during different days, and the comparative analysis of different monitors in Imperial, Riverside and Yuma counties demonstrates a consistency of elevated gusty westerly winds and concentrations of PM_{10} on October 1, 2015 (Section V). In addition, these time series plots and graphs demonstrate that the high PM_{10} concentrations and the gusty westerly winds were an event that was widespread, regional and not preventable. Arid conditions preceding the event resulted in soils that were particularly susceptible to particulate suspension by the elevated gusty westerly winds. Days immediately before and after the high wind event PM_{10} concentrations were well below the NAAQS. Overall, the demonstration provides evidence of the strong correlation between the natural event and the windblown dust emissions to the exceedance on October 1, 2015.

VI.5 Historical Concentrations

The historical annual and seasonal 24-hr average PM_{10} concentrations measured at the Niland monitor were historically unusual compared to a multi-year data set (Section III).

Appendix A: Public Notification that a potential event was occurring (40 CFR §50.14(c)(1))

This section contains wind advisories issued by the National Weather Service and Imperial County on or around October 1, 2015. The data show a region-wide increase in wind speeds and wind gusts coincident with the arrival of dust and high PM_{10} concentrations in Imperial County. In

addition, the **Appendix A supplemental** contains all the NWS notices issued by either the San Diego or Phoenix office by date and time order

Appendix B: Meteorological Data

This Appendix contains the time series plots, graphs, wind roses, etc. for selected monitors in Imperial and Riverside Counties. These plots, graphs and tables demonstrate the regional impact of the wind event.

Appendix C: Correlated PM_{10} Concentrations and Winds

This Appendix contains the graphs depicting the correlations between PM_{10} Concentrations and elevated wind speeds for selected monitors in Imperial and Riverside Counties. These graphs demonstrate the region wide impact of the wind event.

Appendix D: Regulation VIII – Fugitive Dust Rule

This Appendix contains the compilation of the BACM adopted by the Imperial County Air Pollution Control District and approved by the United States Environmental Protection Agency. A total of seven rules numbered 800 through 806 comprise the set of Regulation VIII Fugitive Dust Rules.